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ECONOMIC AFFAIRS

No. 261

ENERGY: STATUS AND DEVELOPMENT -- VIII

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NATIONAL POLICY

PROPOSAL TO COORDINATE DEVELOPMENT OF COAL, NUCLEAR POWER DISCUSSED

Shanghai SHIJIE JINGJI DAOBAO in Chinese No 83, 10 May 82 p 1

[Report: "Major Topics Cropping Up in China's Energy Construction"]

[Text] In view of the shortage of coal in East China and the lack of funds on the part of the state, China should coordinate its investments in the generation of electricity by coal and nuclear power and coordinate repayment terms so as to achieve the dual purpose of building commercial nuclear power stations in East China and at the same time exploiting the coal mines north and south of the Huai River. This is the major topic presented in the outline of the energy policy for East China recently worked out by the East China Regional Committee of the China energy society. Pei Lisheng and Hua Logeng, vice chairmen of the China Scientific and Technical Association, invited experts and responsible members of the Ministry of Coal Industry, the Ministry of Water Conservancy and Power and departments concerned to hold a discussion. They unanimously held: This beginning made by China in carrying out overall planning and taking such factors as technology, economics and management into consideration has embodied the concept of the 10 major economic policies of the Central Committee.

According to investigations, there will be an enormous gap in coal and electricity in the East China region by the 1990's. Therefore, while giving priority to the development of the limited hydroelectric resources in the region, it is necessary at the same time to build commercial nuclear power stations. Introducing relevant technology and key installations, manufacturing complete sets of equipment inside the country by stages and replacing coal with nuclear power will not only contribute to solving the problem of the gap in coal supply in the 1990's, but also will be of important strategic significance in basically reducing East China's consumption of coal and petroleum in the coming century and popularizing nuclear power throughout the country from the nuclear power manufacturing base in East China.

A contradiction has cropped up between the high cost and long period required for the construction of nuclear power stations and the lack of funds on the part of the state. However, if the method of coordinating management with overall planning for coal and nuclear power is adopted, this contradiction can be properly resolved. With the money raised through joint ventures, we will require about 8 to 10 years to build coal mines with a total production

capacity of 6 million tons a year in the mining region north and south of the Huai River. We can make use of the export of coal to compensate for the foreign investment in nuclear power. The construction of two 900,000-kilowatt nuclear power stations will also require 8 to 10 years. When completed they can produce 12 billion units of electricity, replace 6 million tons of coal and produce a net profit of several hundred million yuan. This, in turn, can be used to pay back domestic investments in coal mines and nuclear power stations. In this way, after a certain time, we can also alternately pay back all domestic and foreign investments in coal and nuclear power. By coordinating investments and repayment terms, supporting nuclear power with coal and replacing coal with nuclear power, we can simultaneously develop the two sources of energy at the same time without increasing the burden of the state. This will create the situation of a favorable cycle of using less and less coal for the generation of electricity and producing more and more coal to appear in East China.

This important topic is being jointly studied with the experts concerned in Beijing and East China under the leadership of the three experts Hua Logeng, Tao Hengxian and Yang Jike. They are now working on a feasibility report. The first round of discussions is scheduled to be held in the near future, and a formal report will soon be made to the State Council.

CSO: 4013/105

ENERGY SHORTAGE LAID TO POOR MANAGEMENT, UNREALISTIC PLANNING

Beijing ZIRAN BIANZHENGFA TONGXUN [JOURNAL OF DIALECTICS OF NATURE] in Chinese Vol 4, No 1, 1982, pp 2-4

[Article by Huang Zhijie [7806 1807 2638] of the Energy Research Institute of the State Energy Commission and the Chinese Academy of Sciences: "Analysis of Our Nation's Energy Shortage"]

[Text] Since the founding of New China, we have relied on our nation's energy resources to build a relatively large-scale energy industry. Now, we can provide regular energy equivalent to over 600 million tons of standard coal each year. This has provided an important material foundation for developing industry and agriculture and for living. Of the energy produced in our nation, more than 95 percent is used to satisfy the needs of domestic production and living needs, and we are basically self-sufficient. Therefore, when the worldwide energy crisis occurred, our nation's supply of energy was not affected.

But for a long time in our nation's supply of energy, we only considered satisfying the needs to develop industry and agriculture. We seldom considered satisfying the energy needs of urban and village residents in quantity, variety and quality. Therefore, throughout the nation, nearly half of the farm families lack firewood 2 to 6 months out a year. The lack of firewood for energy needed for daily living in the farm villages averages about 3 months out of the year throughout the nation, and the energy needed by farmers for living cannot be basically guaranteed. In electric power, one-half of the production brigades throughout the nation do not have electricity. There are many cities that are supplied a fixed quantity of coal for living use, and the shortage has to be made up by their own means. The use of convenient and clean coal gas or liquefied petroleum gas and such high quality energy does not exist. Power supply is often interrupted, and this has affected students' studies and the development of cultural life. In winter, heating for houses has always been supplied at a low level. During the season when heating is needed, a fixed amount of coal is supplied per square meter of area and use is contracted. Therefore, it is very difficult to reach the level of heating required for healthy conditions.

Especially in recent years, a serious shortage has emerged in the energy supply. Even the normal development of industry and agriculture cannot be guaranteed. Because the supply of petroleum and natural gas cannot satisfy

the needs, a relatively large portion of the petrochemical industry cannot develop its productive capabilities. In 1979, the state supplied an average of only 67.24 kilograms of diesel fuel per horsepower annually to the farm villages. Calculating at a consumption rate of 200 grams of fuel per horsepower-hour by a diesel engine, this is only enough for farm machinery to operate 33.8 shifts of a ten-hour shift. Machinery for field operations cannot fully develop its function. The development of the electric power industry does not have a corresponding guaranteed supply of coal. The insufficient supply of electricity has hindered industries and enterprises at many places in fully developing their productive capabilities.

The shortage in the supply of energy has brought about a series of serious consequences in national economic development. For example:

1. The Natural Ecological Environment Has Been Damaged

In the farm villages, because of a long period of fuel shortage, forest vegetation has been destroyed, causing soil erosion and causing the soil to become sandy, and such natural disasters as winds, sandstorms, drought and aridity have occurred frequently. According to surveys, the area of soil erosion throughout the nation has increased from 1.16 million square kilometers at the beginning period of liberation to the present 1.5 million square kilometers. Each year, 5 billion tons of surface soil are eroded. The region of most serious soil erosion in the middle reaches of the Huanghe extends from Longmen to Hequ. Each year, over 1.6 billion tons of sand and mud flow into the Huanghe. The desert area has increased from 1.6 billion mu to 1.9 billion mu. The area covered by forests has been gradually reduced year after year, and the natural ecological environment has been severely damaged.

2. The Development of Agriculture, Forestry and Animal Husbandry Has Been Affected

The supply of commercial fuel used for living in the farm villages is limited. Including coal, kerosene and electricity, it constitutes about 14 percent of the total amount of energy used for living in these villages. At present, most of the farmers burn stalks and firewood for cooking food and cooking feed. But from the viewpoint of comprehensively utilizing bioenergy, this is a serious waste of resources. Direct burning of stalks utilizes only a very small part of the energy contained in living organisms. Some potassium fertilizers are left in burnt ash while a large amount of organic matter and nitrogen and phosphorus which are nutritional elements of plants are burned away and destroyed. Inappropriate use of bioenergy has caused a shortage of fuel, feed, fertilizers and light industrial raw materials in the farm villages. Stalks cannot be returned to the fields. The nutrients and organic substances in the soil cannot be replenished, and soil fertility has dropped year after year. When reclaiming the Northeastern region, the content of organic matter in the soil was as high as 5 percent or more. At present, it has dropped to 1 percent to 2 percent. The content of organic matter in inland soil is less than 1 percent. The yield of agricultural crops and the amount of stalks could not increase. The development of livestock production also was limited because of insufficient feed grasses. Every year many regions plant disappearing forests. The distance from logging sites is becoming greater and

greater. Raw materials provided for light industries cannot be guaranteed. The development of agriculture, forestry and livestock production has all been affected.

3. The Development of Productive Capabilities of Industries Has Been Affected

In modern society, a production process cannot be realized without energy. In recent years, because of the insufficient supply of petroleum, coal and electricity, the productive capabilities of a fairly large number of industries and enterprises cannot be fully developed. Especially because estimates of the output of petroleum was too high and the supply of crude oil to newly built oil refineries was insufficient, the oil refining capability could not be fully developed. The productive capabilities of newly built petrochemical plants have accumulated because the supply of petroleum and natural gas as raw materials was insufficient. Some regions shut down industries to resist drought and ordered industry to give way to agriculture. Some regions had to alternate the use of electric power because the amount of electric power for industry itself was not enough. In regions most lacking in electric power, the methods of "operating 3 days and shutting down for 4 days" and "operating for 4 days and shutting down for 3 days" were used to solve the problem of insufficient electric power. As a result, a large number of industries and enterprises did not operate sufficiently, and this caused a great waste of manpower, materials and capital.

4. Revenue of the State Has Been Affected

Costs for fuel to generate power constitutes a relatively small proportion of the total cost of production in most industries except the electric power industry. According to foreign statistics, the average for all industries is 5 to 6 percent. It is the lowest for light industry, only 0.9 percent. It is 3 to 4 percent in the machinery manufacturing industry, 7 to 10 percent in the chemical industry (not including raw materials), and 13 to 14 percent in the iron and steel industry. This shows that the loss to the national economy due to an insufficient supply of energy is about 8 to 100 times the value of energy itself. The prices of our nation's industrial products are relatively high. The price of energy is relatively low, and this multiple relation will enlarge. Thus, because of a reduction in energy supply, industrial production has dropped, and this has seriously affected state revenue and it has further affected the capital for expanding reproduction. The rate of national economic development will surely slow down.

Our nation has rich energy resources and it is a socialist nation. Implementation of a planned economy should not cause an energy shortage, and a serious energy shortage should not emerge. The reasons for today's situation, we believe, are the following:

We have not grasped well the laws of proportional economic development according to plan. In the overall balance of national economic development, we did not arrange well the projects to develop energy. The period of construction for energy production has been relatively long. Take the development of coal as an example. Building a large mine requires about 10 years, and building a

coal time requires an even longer time. Building large hydroelectric power stations and large oil fields all require about 10 years. If these energy development projects are not arranged early, then when the time comes, we will not be able to catch up with the needs of increased consumption of energy brought about by industrial and agricultural development.

Second, the departments that consume energy have developed too quickly, causing the proportion of energy consumption in the national economy to become imbalanced. Several years ago, every locality built a group of factories and enterprises that could be built quickly, that required less investment and that could produce large economic gains, such as machinery processing plants, textile mills and chemical plants. Even though at the time there already was a shortage in the supply of energy and the fuel needed by these factories to generate power could not be guaranteed, they were still built blindly. The localities were not willing to invest capital in energy construction projects which required a long construction period, more investment and which produced poor economic results. As a result, the energy shortage became more and more outstanding.

The third point was that estimates of the output of petroleum were too high. Under the influence of lofty goals, too many oil refineries, too many chemical plants that used petroleum and natural gas as raw materials and too many energy consuming equipment that used petroleum were built, thus deepening the conflict between petroleum supply and demand.

The fourth was that several years ago, under the influence of the extreme leftist line, some coal mines caused an imbalance in stoping and tunneling in order to seize high output, create high goals and multiply increases in output. There were also many deficiencies in production safety. They must be readjusted during these few years, and the output during these few years will surely be affected.

The fifth was poor management and wasteful use of energy. Our nation's energy production ranks fourth in the world, but the amount of consumption ranks third in the world. The amount of energy used is not small. According to the present level of economic development and the living standard of the people in our nation, if this amount of energy is rationally and effectively utilized, such a serious shortage should not have occurred. But because of the low standard of management in the process of energy production, conversion, transportation and utilization, attention was not paid to conservation and results, and the use of energy was wasteful. Especially in some factories and enterprises which have a high profit margin or whose energy cost constitutes a lesser percentage of the total production cost, the use of energy is much less emphasized, and this has worsened the degree of shortage in the energy supply.

Because the energy industry did not arrange appropriate new construction projects during the previous period, and because of insufficient capital to carry out more energy development at present, therefore, over a relatively long period in the future, energy output will not be able to increase by a large scale. But the national economy hopes to maintain a definite rate of development. Under such an energy situation, how can we solve present and future energy problems? We can consider taking the following measures:

1. The basic road of solving the energy problem is to enlarge the scale of energy resources and increase the output of energy. If this problem is not solved, it will affect the energy supply around the year 1990 and the rate of national economic development at that time. Therefore, we must pay attention to this point. We must strengthen prospecting of energy resources, obtain reliable energy reserves, do preparatory work for developing hydroelectricity, and suitably increase investment in the development of energy.

2. The method to solve the energy problem in the near term is to reduce energy consumption and push the economy forward. Energy conservation should be regarded as a priority. Because of poor management, because technical equipment is backward, and because the use of energy is irrational in our nation, there is a lot of waste in the utilization of energy. Many results have been obtained during these few years in energy conservation. The potential of energy conservation is not small. In addition, conservation of energy frequently follows the progress in strengthening management, technological progress, renovation of equipment, reduction of environmental pollution, and actually, this is progress towards modernization.

3. The economic structure should be gradually readjusted, and the amount of energy consumption per unit production value should be reduced. For a long period, our nation has followed a policy of national buildup emphasizing industry and neglecting construction of living facilities. Therefore, since the founding of the nation, the proportion of heavy industry rose year after year. In 1978, heavy industry constituted 57 percent of all industries while energy consumption per 100 million yuan of production value in heavy industry was four times that of light industry. Appropriately adjusting the ratio of heavy and light industries can reduce energy consumption per unit product. This can be done without increasing energy consumption. The production value of the national economy can be increased, the market can become prosperous, people's life can be improved, state revenue can be increased, and further development of the national economy can be stimulated.

4. Economic policies and energy policies favorable to energy conservation should be established. Foreign nations generally believe the price of energy serves a very important function in energy conservation. The practices after the energy crisis abroad proved this point. Many of the prices of coal, oil, electricity and gas in our nation are irrational, and they have had a detrimental effect on the development and conservation of energy. To develop and conserve energy well, we must rationally readjust the prices of energy products. Besides prices, we must also establish economic policies favorable to energy conservation such as making favorable loans and reducing taxes. Also, we must establish energy policies and laws for the rational utilization of energy, stop wastefulness, and improve the rate of effective utilization of energy.

5. Various types of natural energy should be developed to solve the energy problem in farm villages. At present, the energy resources in farm villages that can be massively developed and utilized are mainly the stalks of agricultural crops, firewood, small hydroelectric power, small coal ovens and solar energy. Because of the effects of climate, topography and other natural conditions, there are regional differences in the variety and in the quantity

of energy resources in farm villages, and regional distribution of resources is very uneven. Therefore, to solve the energy problem in our nation's broad number of farm villages, the main effort is not to rely on the state to provide a massive amount of commercial energy, but to suit measures to local circumstances, and to develop many forms of natural energy according to the characteristics of the local energy resources.

9296
CSO: 4013/48

HIGH-SPEED COMPUTERS HELP DEVELOP ENERGY RESOURCES

Beijing GUANGMING RIBAO in Chinese 2 May 82 p 2

[Article: "Our Nation Successfully Develops a High-Speed Computer Suitable for the Development of Energy Resources"]

[Text] According to a report in SCIENCE NEWS, the Computer Technology Institute of the Chinese Academy of Sciences and the Research Institute of the Geophysical Prospecting Bureau of the Ministry of Petroleum cooperated and jointly developed successfully a high speed computer--150 series machine that can process vectors (meaning a physical unit that has both magnitude and direction, such as force, velocity etc.). It has been installed at the Research Institute of the Geophysics Prospecting Bureau of the Ministry of Petroleum and has been used.

This 150 series machine is compatible with the 150 machines produced domestically. It utilizes the main memory of the 150 computer and its peripheral equipment. It can perform 57 types of operations. The highest computational speed is 14 million times per second. It is especially suited for energy prospecting and development work which require massive vector computations. Compared to other high-speed vector computers being developed domestically, this kind of computer has a higher processing efficiency, and it is more suitable for processing seismic data in prospecting for petroleum. Compared to certain number sequence machines imported from abroad, it can solve some problems that the imported machines cannot solve. It can also be used in other scientific and technical fields that require massive vector computations, such as: signal processing of atomic reactors, processing sound signals, satellite image processing, simulation of machinery systems, power network simulation and vibration and structural analysis, etc.

The 150 series machine has a short development cycle and its economic gain is good. The Research Institute of the Geophysics Prospecting Bureau of the Ministry of Petroleum began to use the 150 series machine to prospect for petroleum in the ocean and to perform contract work beginning this year. Preliminary estimates show that in one year, it can save the nation more than US$500,000 in foreign exchange. The efficiency and precision of the machine are high, stable and reliable. When processing horizontal superposition, the highest processing efficiency is 7 times that of the 150 computer. The quality

and precision of processing are both higher than those of the 150 computer. When processing excursions of two-dimensional wave equations, the processing efficiency is three times that of the imported CYBER172 computer. Their quality and precision of processing are equivalent.

9296
CSO: 4013/79

POWER NETWORK

WORK ON SHANXI SEGMENT OF DATONG-BEIJING ULTRA-HIGH-TENSION LINE BEGUN

Taiyuan SHANXI RIBAO in Chinese 6 May 82 p 1

[Article by Hui Quan [1920 3123]: "Construction Has Started on the Shanxi Segment of Our Nation's First Highest Voltage Transmission Line"]

[Text] Construction of the Shanxi segment of our nation's first highest voltage transmission line from Datong to Beijing's Fangshan with an ultrahigh transmission voltage of 500,000 volts officially began on 27 April.

The ultrahigh voltage transmission line of 500,000 volts from Datong to Fangshan traverses a total length of 296 kilometers. The line starts from the Datong Second Power Plant in our province to the Fangshan substation in Beijing. The line passes through our province's Datong City, Datong County, Yanggao County, Guangling County, Hebei Province's Wei County, Yi County, Zhuo County, and enters Fangshan County in Beijing Municipality. The whole line is divided into the eastern segment and the western segment. The line inside Hebei Province and Beijing is the eastern segment. Construction is done by the Beijing Power Transmission and Transformer Engineering Company. The 103 kilometers of the line inside Shanxi constitute the western segment and it is constructed by our province's power transmission and transformer engineering company.

The whole power transmission line is hung overhead by steel towers. Power transmission capacity is 1 million kilowatts. After completion of the line, the strong current generated in the Shanxi coal base will be transmitted along the line continuously to the Beijing, Tianjin and Tangshan power network. This will guarantee the supply of electricity for agricultural production and people's lives in the North China region, especially the supply of electricity for the capital. It will also serve greatly to improve the quality of power supply to the power network.

This 500,000-volt ultrahigh voltage transmission line is the transmission line with the highest voltage in our nation at present. To build this line with high quality and quickly, the party committee of the province's Power Transmission and Transformation Engineering Company has carried out a lot of preparatory work since last year. Right now, the workers are in a fighting mood and are exerting all efforts in the construction work. They are determined to complete the task satisfactorily by the end of next year.

9296
CSO: 4013/79

BRIEFS

BAOGANG THERMOELECTRIC POWER PLANT--The thermoelectric generator with the largest capacity installed by ourselves in our nation--the Baogang Power Plant's first 350,000-kilowatt generator--will soon join the network and generate electricity. It will become the first project of the Baogang General Plant to realize economic benefits. Although it was the first time that the construction units subordinate to the East China Power Construction Bureau had participated in the construction of such a large generator, they daringly overcame the difficulties and daringly used many new techniques, new technologies and new materials. Construction of the entire generator progressed smoothly and they created a new path for building large power stations in our nation. The Baogang Power Plant uses a new automated system of computers to monirot and control operations. The degree of automation is the highest among all power stations in the nation. [Text] [Shanghai WEN HUI BAO in Chinese 30 Apr 82 p 1] 9296

CSO: 4013/85

LIAONING POWER PROJECT--In Liaoning, the project to increase the voltage of the Anshan power grid from 44 to 66 kilovolts was completed at the end of May. The transmission capacity of the power grid has increased 30 percent, and 27 million kwh of electricity will be conserved each year. [Shenyang Liaoning Provincial Service in Mandarin 2200 GMT 19 Jun 82 SK]

HEILONGJIANG POWERPLANT--To alleviate the power shortage in the central and western parts of Heilongjiang Province, the state has recently approved construction of a new powerplant--the Harbin No. 3 power plant--in Shulan County. This project has been listed in this year's capital construction plan. Electricity has been in seriously short supply for the last few years. In the first stage of this project, two 200,000-kilowatt generating units will be built with the joint funds of the state and the locality. This year some 9 million yuan of investments are projected to make preparations for the construction, which will start next year. [Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 22 Jun 82 SK]

JILIN'S ELECTRICITY IMPROVES--Thermal power throughout Jilin Province fulfilled the semiannual target 13 days ahead of schedule. By 17 June, thermal power plants across the province generated 4.4 billion kwh of electricity, fulfilling over 50 percent of the annual target. [Changchun Jilin Provincial Service in Mandarin 1100 GMT 23 Jun 82 SK]

SHANDONG POWER PRODUCTION--Despite serious shortages of water and fuel, power departments in Shandong Province have made utmost efforts to produce as much power as possible to support rural antidrought efforts. In the first 5 months of this year they supplied 1.32 billion kwh of electricity to rural areas, an increase of over 30 percent over the 1981 level. Because of shortages of water and fuel, power generators with a combined capacity of 400,000 kilowatts have been unable to operate. [Jinan Shandong Provincial Service in Mandarin 1100 GMT 11 Jun 82 SK]

QINGHAI SUBSTATION--The largest substation is under construction in Huangyuan County, Qinghai Province. This substation with a capacity of 330 kilovolts is a subsidiary project of the Longyangxia power station. Responsible construction units are arranging personnel and technicians to work at the construction site. [Xining Qinghai Provincial Service in Mandarin 1100 GMT 28 Jun 82 SK]

CSO: 4013/121

POWER TRANSMISSION LINE--Hangzhou, 30 Jun (XINHUA)--A 220,000 volt power transmission line, part of the East China power grid, was put into operation today. The line, 204 kilometers long, extends from Changzhou City in Jiangsu Province to Xiaoshan City in neighboring Zhejiang Province, running somewhat parallel to the 220,000-volt Changzhou-Hangzhou line. Both lines stretch across densely populated areas in East China with expanding industry and agriculture. A 300,000-kilowatt power generating unit now being installed in the Jianbi power plant in Jiangsu Province will add to the power supply of the East China power grid. Another 220,000-volt transmission line is being put up in southern Zhejiang Province to incorporate the Taizhou power plant, now under construction, into the grid. [Text] [Beijing XINHUA in English 1839 GMT 30 Jun 82 OW]

FUJIAN POWERLINE--Fuzhou, 1 Jul (XINHUA)--A 2-kilometer high-voltage power transmission line across a portion of Xiamen Harbor has been carrying electricity normally from Fujian on the mainland to Xiamen Island since it began operation in late March, according to the Fujian Provincial Power Department. Construction of the line was aimed at increasing power supply for the Xiamen special economic zone and Xiamen City, the department said. Through the line is supplied more than 20 times as much electricity as [provided by] the single small thermal power plant on the island. Its midpoint is an islet, called Huoshao. The line was erected in less than 6 months and was cited by the Ministry of Water Conservancy and Power for its high quality. It was designed and built by Fujian power technicians and workers. [Text] [Beijing XINHUA in English 0710 GMT 1 Jul 82 OW]

CSO: 4010/10

JILIN POWER TRANSMISSION LINE--The Provincial Power Transform and Supply Construction Company built another 500,000-volt superhigh tension power transmission line between Yuanbaoshan and Jinzhou. After a year of construction, the line was put into operation on 2 June. It is expected that the line will enable the Yuanbaoshan power plant to give fuller play to its equipment, improve the structure of the Dongbei power grid and promote industrial and agricultural production. [Changchun Jilin Provincial Service in Mandarin 1100 GMT 4 Jun 82 SK]

HUNAN POWER TRANSMISSION LINE--Another 220,000-volt high-tension power transmission line has been erected in Hunan Province. On 13 May, this line began transmitting electricity. This line begins at the (Fengtan) hydrolectric power station in west Hunan, passes through Yuanling, Taoyuan, Changde, Taojiang and Yiyang counties, and joins the big power grid at the Yiyang transformer station. Its total length is 238 km. This transmission line is one of key projects in this province. This line can supply a 100,000-kilowatt load to central Hunan from the (Fengtan) hydroelectric power station and the amount of power able to be transmitted is 2.2 million kilowatt-hours. It will be beneficial to alleviating the situation of the short supply of power and to promoting the development of industrial and agricultural production in central Hunan. [Changsha Hunan Provincial Service in Mandarin 2310 GMT 17 May 82 HK]

HUBEI ELECTRICITY OUTPUT--Hubei Province overfulfilled its quota for electricity output for the first quarter of this year by 9.6 percent. The installed capacity of hydroelectric power stations in the province is greater than that of thermal power stations. To raise economic results, electric power departments in the province have taken measures to stop some thermal power generation units operated by oil and coal and to replace them with hydroelectric power stations. The consumption of coal for generating each kilowatt-hour in the first quarter of this year was 10 grams less than the planned consumption. As a result, the province saved 14,000 tons of raw coal. The three generation units of the Gezhouba power plant have been put into full operation. In the first quarter, the Gezhouba power plant generated 800 million kilowatt-hours and the province thus saved some 170,000 tons of coal. [Wuhan Hubei Provincial Service in Mandarin 1100 GMT 8 Apr 82 HK]

JILIN ELECTRIC POWER OUTPUT--Jilin Province generated over 2.38 billion kwh of electric power output in the first quarter, a 6.8 percent increase over the corresponding 1981 period. The province also prefulfilled the quarterly production plan by 1 day. [Changchun Jilin Provincial Service in Mandarin 2200 GMT 1 Apr 82 SK]

HUNAN ELECTRICITY OUTPUT--Electric power departments in Hunan Province overfulfilled their quotas for electricity output for the first quarter of this year. Provincial subordinate power plants generated some 2.23 billion kilowatt-hours, 150 million kilowatt-hours more than the quota for electricity output and 10 percent more than in the corresponding period of last year. [Changsha Hunan Provincial Service in Mandarin 1100 GMT 7 Apr 82 HK]

CSO: 4013/102

FIRST PHASE OF PEARL RIVER PLAN SLATED FOR COMPLETION BY YEAR 2000

Guangzhou NANFANG RIBAO in Chinese 20 Apr 82 p 1

[Article: "State Capital Construction Commission Officially Approves Comprehensive Development of Pearl River Basin, Scope of Development Includes Flood Prevention, Navigation, Irrigation and Power Generation. Among the Projects, the Development of Hydroelectric Resources of the Hongshui River Is the Key Measure To Solve the Problem of Electricity for Guangdong and Guangxi"]

[Text] The plan for the comprehensive development of the Pearl River Basin proposed by the original Water Conservancy Ministry was officially approved by the State Capital Construction Commission recently and the plan was determined to be an important part of developing the national territory. From the sixth to the tenth of this month, the Pearl River Water Conservancy Committee of the Ministry of Water Conservancy and Electric Power held a meeting of concerned departments of the six provinces (regions) of the river basin and established a coordination group to coordinate the plans for the Pearl River Basin. Work was clearly divided, the schedules were coordinated, and the plan was being drawn up with intensified efforts. It is planned that after the first phase of construction is completed by the year 2000, flood prevention, navigation and irrigation in the whole river basin will visibly improve and the capability to generate electricity will be greatly improved.

The Pearl River is a large river in our nation's southern part. It crosses the six provinces (regions) of Yunnan, Guizhou, Guangxi, Hunan, Jiangxi and Guangdong and the basin covers 450,000 square kilometers. The hydroelectric resources of the Pearl River are very rich. The installed capacity of the power resources that can be developed reaches 24 million kilowatts. Now, only 7 percent has been developed and utilized. Bazi Prefecture of Nanpanjiang and the lake regions at the upper reaches, the Yujiang, Yinjiang and Xunjiang Plains in the middle reaches and the Pearl River Delta at the lower reaches are all important commercial food grain bases and regions of economic crops of Yunnan, Guangxi and Guangdong. The scope of development includes flood prevention, navigation, irrigation, electricity generation and other comprehensive utilizations. Rational development and utilization of hydroelectric resources of the Pearl River, elimination of the harmful and development of the beneficial all have important significance in the economic development of each of the provinces (regions) of the river basin. If the hydroelectric

resources of the Hongshui River in Guangxi are developed, the installed capacity can reach 10 million kilowatts, and the annual output of electricity can be 50 to 60 billion kwh. This is a key measure to solve the problem of electricity in Guangxi and Guangdong. The navigational channel for 1,000-ton vessels from Guangzou to Nanning in Guangxi enables the coal in Guizhou to be supplied continuously to Guangzhou. Dredging the Xijiang and the Beijiang will guarantee the safety of Guangzhou City in flood prevention and at the same time it will greatly reduce damage by floods and waterlogging of nearly 10 million mu of farmland in the Pearl River Delta.

At present, those participating in surveying, designing and planning for the Pearl River basin include the Pearl River Committee and its subsidiary Xijiang Bureau, engineers and technical personnel of the water conservancy, electric power and navigational departments of the six provinces (regions), and engineering and technical personnel from the South Central Surveying and Designing Institute, the Northeast Surveying and Designing Institute, the Kunming Surveying and Designing Institute of the Water Conservancy and Electric Power Ministry, the Surveying and Designing Institute of the Ninth Engineering Bureau, and the Institute for Planning and Designing Navigation and Shipping of the Ministry of Communications. They will finish drawing up the entire plan for the development of the whole river basin by the end of 1984 and they will select the first phase projects for construction. It is planned that construction of the first phase will be completed by the year 2000.

9296
CSO: 4013/90

EXPERIENCE IN THE PLANNING OF COMPREHENSIVE USE OF THE HONGSHUI RIVER

Beijing NENGYUAN [JOURNAL OF ENERGY] in Chinese, No 1, 25 Feb 82 pp 8-11

[Article by Weng Changpu [5040 7022 3302] of the Kunming Prospecting and Design Academy of the Ministry of Electric Power]

[Text] The Hongshui River is the main trunk of Xijiang of the Zhujiang River system. It flows from the Yunnan-Guizhou Plateau into the Guangxi Basin. Rainfall is abundant. The falls are concentrated, and the reserve of hydraulic energy is very rich. After the founding of the nation, all of the hydroelectricity designing academies conducted massive surveys and carried out designing and planning work. At present, what is known as the hydroelectric base of the Hongshui River involves ten hydroelectric power stations including Tianshengqiao in the upper reaches and Datengxia in the lower reaches (See planning diagram).

The main trunk of the river from Tianshengqiao to Datengxia extends 937 kilometers. The total fall is 756.5 meters. The average flow at Datengxia over many years is 4,210 cubic meters/second. The total installed capacity of the ten step power stations can reach 11 million kilowatts with an annual power output of 50 to 60 billion kwh, equivalent to a large coal base with an annual output of 30 to 40 million tons. This area is an important energy base that the South China region, which has a greater shortage of mineral and fuel resources, can rely upon. Recently, the National Energy Commission and the State Planning Commission jointly held a meeting to review the plans for the Hongshui River. The meeting came to the correct conclusion in its review and this will surely push forward the work of developing the Hongshui River.

Several experiences in the work of planning for the Hongshui River are discussed in the following.

I. River Planning Must Handle the Relationship Between Hydroenergy Resources and Land Resources

Our nation has a monsoon climate. The arid and wet seasons are clearly separated. The runoff of the 12 rivers has great seasonal differences. The runoff of the Hongshui River from May to October constitutes 82 percent of the total runoff of the year. The runoff during the dry season constitutes only 18 percent. To effectively utilize hydroenergy resources and at the same time

satisfy the demands of other aspects of comprehensive utilization, we must build reservoirs to regulate runoff.

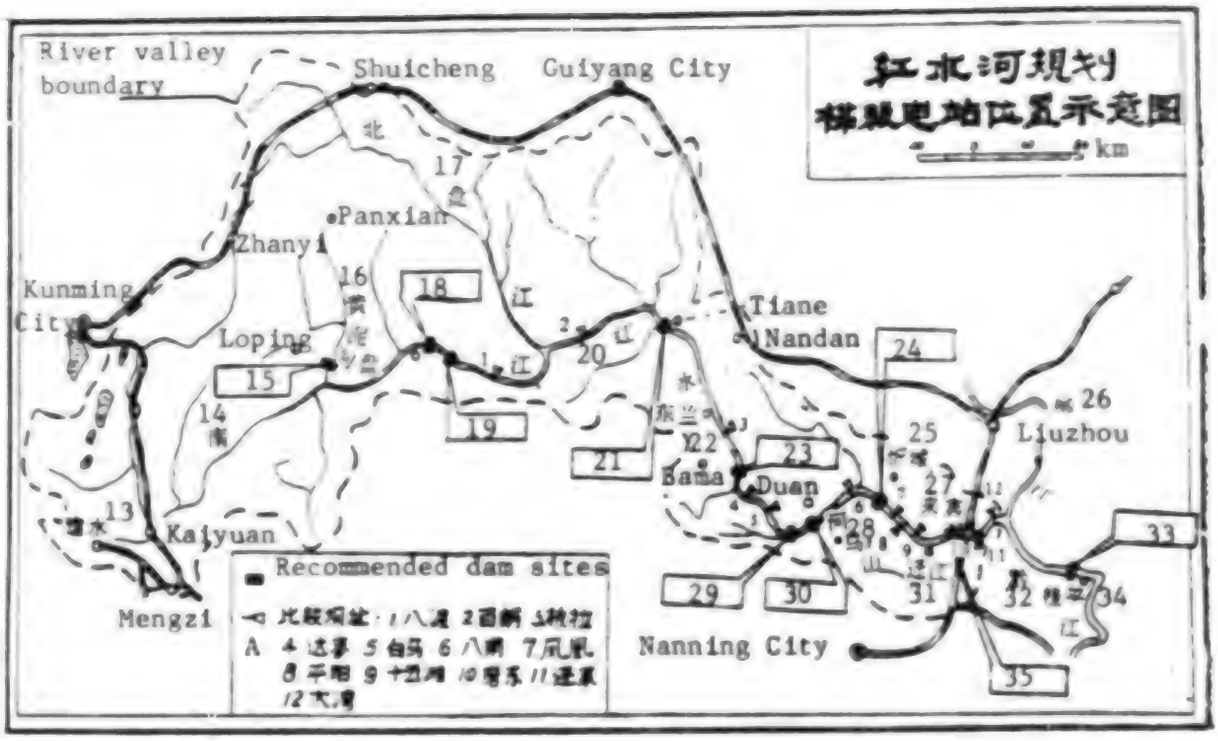
At the end of the 1950s and the beginning of the 1960s, we drew up plans for the Hongshui River, but at that time, too much emphasis was placed on the gain from developing the benefits and eliminating the shortcomings. The method of development using few step stations and a high dam reservoir was followed. This plan basically flooded all the county towns and plains along the river. Such a plan is not possible to realize.

Plans drawn up at the beginning of the 1970s used the method of building many step stations. All of the hydroelectric power stations were of the low waterhead runoff type. Compared to the previous plan, this plan has an installed capacity and a power output of 40 percent and a guaranteed output of 20 percent. Because the river bed is narrow and the variation in water level is large, the least waterhead necessary during the flooding season is lost. None of the power stations could generate electricity, and they become redundant capacities in the power system while the investment per kilowatt is higher than that of the previous plan by more than threefold. Therefore, this plan is also not feasible.

To handle the relationship between hydroenergy resources and land resources, we must carry out comprehensive technical and economic proofs. Building a reservoir on flat topography and on steep slopes and in mountain valleys will bring about big changes because of the flooding of land and the relocation of the population. Reservoirs must occupy land, but plans must start out from the comprehensive economic gain so that the least amount of land is occupied while the maximum amount of electricity is generated and the maximum amount of gain is realized in comprehensive utilization. The topographical conditions along almost the entire segment of the Hongshui River are suitable for building high dam reservoirs. But the mountains are high and the valleys are deep at the upper reaches, the geological conditions are good, there are few people, and building a tall dam and large reservoir to regulate flow can increase the guaranteed output and electricity of each step power station along the entire river. The geological conditions of the middle and lower reaches are poor and the regions are densely populated. If a high dam and large reservoir are built, the loss from flooding will be great and the gain from regulation by the reservoir will be about the same. Therefore, the current plan calls for building combined step power stations at the upper reaches, building two high dams and multiple-year regulatory reservoirs at Tianshengqiao and Longtan, and building additional steps and low dams and reservoirs with less regulatory functions along the river segments of the middle and lower reaches. In such a plan, the installed capacity and the amount of electric power output are all greater than the plan drew up during the 1950s, and the requirements for comprehensive utilization can be appropriately satisfied. Loss due to flooding can be reduced by three-fourths to one-third.

In our nation's regions where large and medium sized hydroelectric power stations are being built, generation of an average of 100 million kwh of electricity requires flooding 740 mu and evacuating a population of 560 persons.

The several major power stations and reservoirs of the hydroelectricity base of the current plan for the Hongshui River have been appropriately selected, therefore, the size of the population to be evacuated and the area of land occupied are smaller, as shown in the table.



Sketch Map of the Sites of the Step Power Stations in the Hongshui River Plan

A. Comparative dam sites

1. Badu
2. Bailang
3. Banla
4. Damai
5. Baima
6. Bafu
7. Fenghuang
8. Pingyang
9. Shiwutan
10. Modong
11. Penglai
12. Dawan
13. Jianshui
14. Nanpan River
15. Lubage
16. Huangni River
17. Beipan River
18. Tianshengqiao
19. Pingban
20. Hongshui River
21. Longtan
22. Donglan
23. Yantan
24. Etan
25. Xincheng
26. Liu River
27. Laibin
28. Mashan
29. Dahua
30. Bailongtan
31. Qianjiang
32. Qian River
33. Datengxia
34. Guiping
35. Qiaogong

Comparison of the loss due to flooding and the annual output of electricity of the major steps on the Hongshui River

Name of power station	Normal water level	Annual output (100 million kwh)	Farmland flooded (mu)	Farmland flooded per 100 million kwh (mu)	Resettled population	Population resettled per 100 million kwh
Tianshengqiao	780	135	27060	200	25100	186
Longtan	400	186	55000	296	64000	344
Yantan	223	80	29156	364	37565	469
Datengxia	57.6	70.6	25877	367	47755	676
Total		471.6	137093	291	174420	370

Note: The Tianshengqiao hydroelectric power station includes the indices of the two hydroelectric power stations of the Basuo low dam and Bapan high dam.

II. River Plans Must Handle the Master and Slave Relationship Among the Goals of Development and Stress the Economic Results of Investment

Past river plans customarily were drawn up for comprehensive utilization -- i.e., adhering to the guiding principle of multiple goal development. Single goal and multiple goal development should all be determined by the natural characteristics of the river or the river segment and the socio-economic situation of a definite period in related areas. Clarifying the main goal and considering other appropriate gains so that state investment can realize the best economic results are an important subject in planning.

The section of the Hongshui River above Qianjiang has a valley topography and there is no need for flood prevention. The cultivated land is scattered and there are no relatively concentrated irrigated regions. River traffic has never been heavy. The legnth of this section constitutes over 80 percent of the river segment included in the plans. The reserves of hydraulic resources are very rich. This review meeting has determined that the plan for the Hongshui River mainly for power generation while concurrently serving flood prevention, irrigation and navigation is indeed practical.

There was once a plan to develop the Hongshui River for the single purpose of navigation. The Etan flood gate and dam, the river's first dam, was a dam for navigation. During the past 10 years, several tens of millions of yuan have been invested but the gain has been very small. The section beyond Etan has always served regional navigation. Because the river channel is steep and because most of the river bed is of limestone, there are many dangerous sections. Gaokantan above Beipanjiang is a natural obstacle that is difficult to pass. These major bars, as their names imply, are seen everywhere and navigators fear them. The Hongshui River contains a lot of sand. After building the Etan dam, annual silting in the navigational channel of the upper and lower reaches of the dam amounts to over 1 meter. Except for about 10,000 tons of annual agricultural, sideline and mountain products, there are no sources of staple commodities being transported on the river segments of the middle and upper reaches. The difference in water level between the flooding and dry periods is very large. At some places, the difference is more than 50 meters, and the conditions for building wharves are difficult. Even after completing each step of the plan, there could only be inner lakes between mountains and waterways. If the Longtan reservoir is used as a shipping center, the water level may drop by 70 to 80 meters and the difference in altitude of the topography around the reservoir can be over 1,000 meters. It would be very difficult to build facilities for shipping. Therefore, consideration of the navigational benefit of the Hongshui River should emphasize the lower reaches. The design of the Datengxia hydroelectric power station should include and demonstrate an appropriate scale of navigational and shipping facilities.

The segment of the Hongshui River below Qianjiang is a karst region. An irrigated region was once built here. Because the cultivated land does not retain water and the cost of water is high, it seems that the area of farmland that can retain water should not be enlarged.

The segment below Qianjiang in Guangxi requires flood prevention. But since the year 996 AD when record-keeping began, there has not been any trace of

The procedure of developing the step hydroelectric power stations on the Hongshui River has been changed several times. In the plans drawn up at the end of the 1950s, the first phase of construction recommended was the last step hydroelectric power station at Datengxia. At the time, Datengxia used a high dam and large reservoir. Its regulatory function was good and it was also near Guangzhou City which had a shortage of electricity. At the time, this seemed rational. In the plans drawn up at the beginning of the 1970s, Datengxia's water level dropped from 75 meters to 45 meters. The regulatory function was very poor. It could not generate electricity during the period of flooding. As a result, the medium scale Dahua hydroelectric power station at the middle reaches was selected. Several years ago, consideration was given to developing the Tianshengqiao and Longtan hydroelectric power stations as the first phase construction after Dahua. At the time, the major consideration was to supply electricity to nearby Pingguo. Longtan is the key project serving a control function along the whole river segment. When it is developed, the whole system will become active. Because its reservoir capacity is large, its completion can improve the conditions of construction and operation of the step power stations in the lower reaches, and it can improve the guaranteed output, the annual amount of electricity and the quality of electric power of the step power stations. Consideration was also given to matching the development of Datengxia by following Longtan. The advantages are that transportation is convenient, the construction site is wide and it is near Guangzhou. In recent years, because of national economic readjustment, and because the scale of the Longtan hydroelectric power station is large, the investment is large, the construction period is long, the technology is complex, it was decided to delay the construction of Longtan. As Longtan was being delayed, the Datengxia hydroelectric power station also lost its precondition as the project to be developed during the first phase. Recently, it was decided to develop the high dam at Tianshengqiao and the low dam hydroelectric power station at Tianshengqiao first. The scale of these hydroelectric power stations correspond to the needs of increased loads in Guangdong, Guangxi and Guizhou.

The Tianshengqiao hydroelectric power station is to be built in phases. The first period of construction will utilize the concentrated fall at Leigongtan. A low dam will be built at Basuo and a tunnel will be built for an installed capacity of 800,000 kilowatts. The second phase of construction will be the building of the high dam at Bapan to realize a regulatory reservoir capacity of 6.8 billion cubic meters, expanding the low dam hydroelectric power station at Basuo to increase the installed capacity by 440,000 kilowatts. The installed capacity of the high dam of the second phase will be 1.08 million kilowatts. The total installed capacity will be 2.42 million kilowatts, the guaranteed output will be 1.15 million kilowatts, and the annual electric power output will be 13.5 billion kwh. This also enables the power stations that have already been built at Etan and Dahua and other power stations to be built to gain from compensatory regulation next only to that which would be provided by Longtan and to increase the guaranteed output and annual electric power output. At present, relatively full preparations have already been made for the first phase construction of Tianshengqiao (it is a delayed construction project). Although it is far away from the load center, the straight line distance from Guangzhou is only 1,000 kilometers. This is rational in view of the present power transmission technology and economic buildup. Generally speaking, in the procedure to develop the step hydroelectric power stations on

the Hongshui River, the major step stations at Tianshengqiao, Longtan, Yantan, Datengxia should be built before other step stations. After Tianshengqiao has been developed first, the later order will not remain unchanged. When full operation begins, we still have to conduct technical and economic proof according to the situation.

IV. Plans of the Hydroelectricity Base Must Dynamically Affect the Development of the Electric Power System

The procedure of developing the hydroelectricity base is limited by regional economic development and also stimulates regional economic development. Some nations of the world that have rich hydroenergy resources, such as Canada and Brazil, import ore in sand form for smelting (products that consume a large amount of electric power). Actually, this is exporting energy. Guizhou and Guangxi have rich resources of nonferrous metals. Providing them with inexpensive electric power will promote the development of this type of enterprises.

The planning of the electric power system involves mainly the selection of the localities of the power source and planning the backbone power network to be installed. In the South China region where there is a shortage of minerals and fuel, the focus should be on hastening the development of Hongshui River. The characteristic of hydroelectric and electric power is seasonal unevenness, and necessary thermal power plants must be provided as an auxiliary. But, we must not simply utilize the difference between the installed capacity and the guaranteed output and build thermal power plants to balance it. To increase the proportion of hydroelectricity in the electric power system, we should pay attention to the following factors:

First. When building hydroelectric power stations, we must reduce the redundant capacity that cannot be utilized for long periods. We can study construction in phases and installing generators in phases. For example, the final scale at Dahua is 600,000 kilowatts but we first install 400,000 kilowatts.

Second. We must conscientiously study future load characteristics. At present, the proportion of electric power used for living in our nation is very small, for example in Guangxi it constitutes about 4 percent. But, as production develops and as the people's standard of living rises, the proportion of electricity consumption for living will increase day by day. Industrial production in the South China region has undergone a definite degree of self-readjustment because of the long period of shortage of electricity due to the dry seasons. For example, inspection and repair of equipment and vacations for workers have been partially arranged during the dry season. If the policy of seasonal pricing of electricity is implemented for several products that consume a lot of electricity so that seasonal electric power can be utilized to realize seasonal production, and so that the redundant capacity in the electric power system can be reduced. This should be an important economic policy in the development of hydroelectricity that we should study.

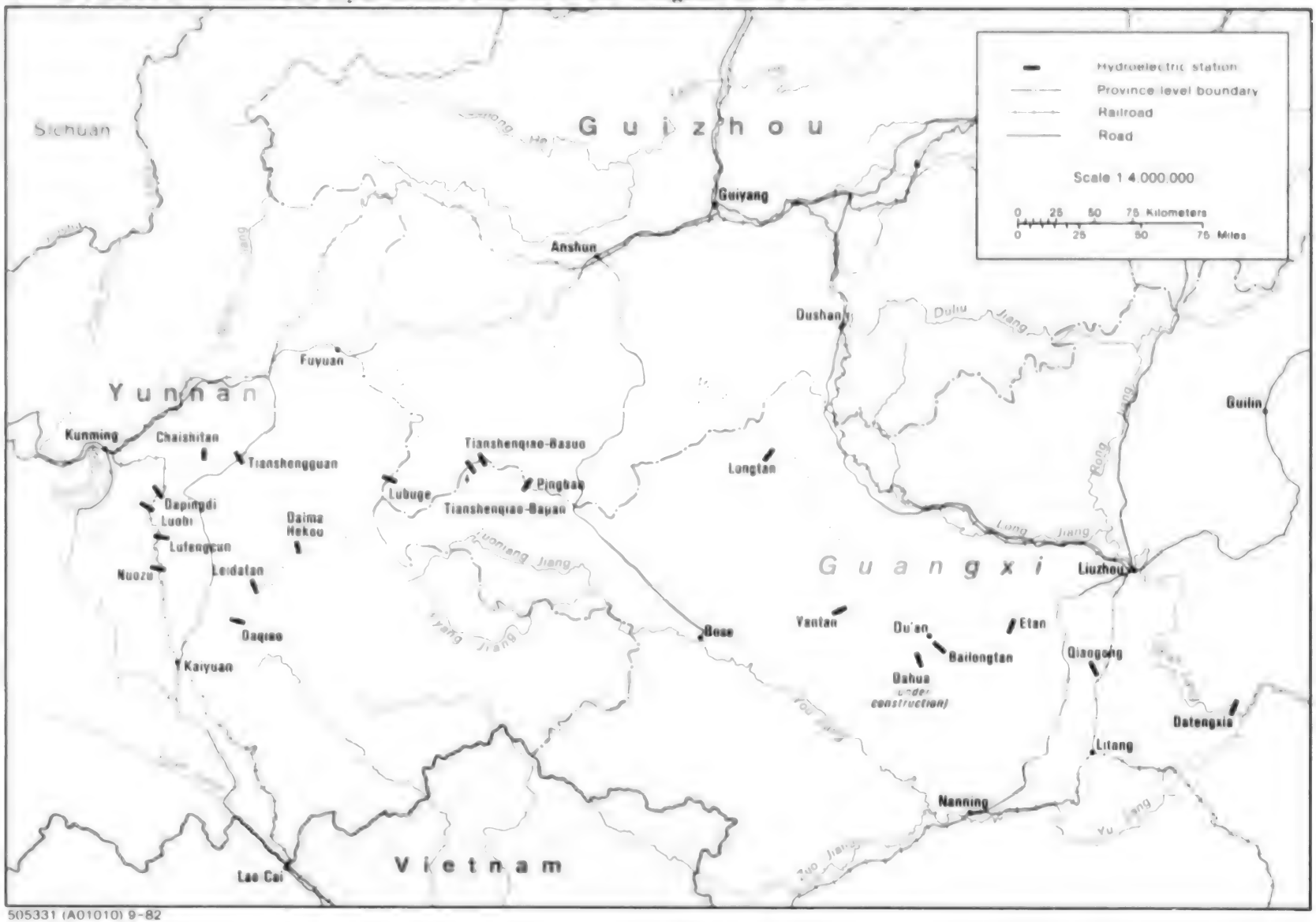
Third. The Tianshengqiao hydroelectric power station is only 80 kilometers from the Lubuge hydroelectric power station now being built and it is 120 kilometers from Pan County. After the ultrahigh voltage power transmission line from Tianshengqiao to Guangzhou and Guangxi is completed, it should be connected to

the network with Lubuge and the Pan County thermal power plant. In this way, during the abundant water period, hydroelectricity can be transmitted to the east. During the dry season, coal from Liupanshui Prefecture can become electricity to be sent to the east. Fully utilizing existing power transmission lines is more economical than shipping coal to Guangdong and Guangxi to generate electricity. Tianshengqiao should be considered as a hub of hydroelectricity and coal fired electric power to be sent to the east.

Building the South China power network according to the above ideas with future prospect of connecting it with the Yunnan and Guizhou power network is a problem worth studying.

9296
CSO: 4013/75

China: Planned Distribution of Hydroelectric Stations in the Hongshui River Basin



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WORK RESUMES ON TIANSHENGQIAO--KEY HONGSHUI RIVER PROJECT

Guiyang GUIZHOU HUABAO in Chinese No 3, 1982 pp 15-22

[Article: "Work Starts on Tianshengqiao Hydropower Project"]

[Text] This year, work has been resumed on the Basuo power station of the two-step Tianshengqiao hydroelectric complex. The Tianshengqiao hydroelectric project is an important part of the Hongshui River cascade development plan and one of China's large-scale hydropower projects now under construction.

The upper reaches of the Hongshui River are known as the Nanpan River, which belongs to the Xijiang River system of the Pearl River drainage basin. Its source is at Maxiongshan in Yuanna's Zhanyi County and after meeting the Huangni River at the juncture of the three provinces of Yunnan, Guizhou, and Guangxi, it flows into Guizhou, forming the border between that province and Guangxi. From there it meanders eastward to Wangmo County. Here it meets the Beipan River after which it is called the Hongshui River. The Hongshui River, because of its large volume of water, is referred to as one of China's "mother lodes" of hydro-energy resources. From Tianshengqiao on the Nanpan River to Datengxia on the Qianjing River there is a drop of some 750 meters over a distance of 1,050 kilometers. Approximately 11 million kilowatts can be harnessed for an average yearly output of more than 50 billion KWH. With this kind of potential, the Hongshui River can play a vital role in the development of the economy of Guizhou Province as well as the economies of Guangxi and Guangdong provinces and have a major impact on easing the criticial energy resources situation in South China.

In order to better develop and utilize the abundant hydro-energy resources of the Hongshui River, the State Planning Commission and the State Energy Commission last year jointly convened a meeting to investigate the Hongshui River plan.

Here, the policies, programs and sequence of developing the Hongshui were subjected to thorough technical and economic analyses until there was a consensus to concentrate first on the development of hydropower to be followed by flood control, navigation, irrigation and aquatic products in a comprehensive utilization policy. Also agreed upon was a development program for Tianshengqiao, Pingban, Longtan, Yantan, Dahua, Bailongtan, Etan, Qiaogong and Datengxia. Of these, Tianshengqiao Bapan, Tianshengqiao Basuo and Pingban

are within the boundaries of Guizhou Province. The conference also proposed that work would resume this year on the Tianshengqiao Basuo (lower dam) hydroelectric station while preliminary work would be done on the Tianshengqiao Bapan (upper dam) so that construction can begin in the "Sixth Five-Year Plan."

The left end of the Basuo power station dam is located in Anlong County, Guizhou Province while the right end is situated in Longlin County, Guangxi Province. The power station is 230 kilometers from Guiyang, 380 kilometers from Nanning, and 820 kilometers from Guangzhou (as the crow flies). Two kilometers upstream from the dam is the original "Tianshengqiao" ["Natrual Bridge"], carved out by the river, from which the dam gets its name. Three kilometers below, at the famous Leigongtan, the riverbed drops precipitiously and the water roars like thunder; there are many shoals and rapids over a 10-kilometer stretch and there is a natural drop of 180 meters. With this rich natural resource, hydropower developers have for some time had their eyes on the river. Since 1954 the plans for the river basin have placed a priority on the Basuo hydropower station of the Tianshengqiao.

The Basuo power station makes use of a concrete gravity dam 58 meters high [and 464 meters long], with power being generated by means of water diversion. Tunnels 9 meters in diameter and 11.34 kilometers in length bored into the right bank bring water to the generator building through [three] high-pressure pipes. The generator building is lcoated on the right-hand, downstream side of the dam. Initially, four turbine generators in the generator building will have a capacity of 880,000 KW, or an average power output of 4.83 billion KWH a year; it will eventually house six generators with a total capacity or 1.32 million KW for an average annual output of 8.2 billion KWH.

Since the reservoir capacity of the Basuo lower dam power station is fairly small (only 26 million cubic meters), the average power output during the low water season is only 190,000 KW. This requires an additional power station--the Bapan high dam--to make full use of the tremendous natural drop of the Leigongtan and increase the power output during the low water season. The Tianshengqiao Bapan (upper dam) power station is located on the upstream side of the lower dam at a distance of 4 kilometers from it; it has a height of 185 meters and a reservoir capacity of 8.85 billion cubic meters. Six turbine generators will be installed for a total capacity of 1.08 million KW; guaranteed output is 420,000 KW, or an average annual output of 5.3 billion KWH. The Bapan power station's reservoir has the further advantage of being able to regulate the downstream volume of water and guarantee power output for the cascade hydroelectric stations on the lower reaches of the river. Of these, it can augment the Basuo power station's independent output of 190,000 KW in a combined operation of 730,000 KW. In order to reduce the State's economic burden and on the basis of the characteristics of the hydropower resources of this stretch of river, the State has opted for an interlocking, overlapping system. Construction time will be 6 to 10 years.

The total installed capacity for the two-step Tianshengqiao hydropower complex will be 2.4 million KW with a guaranteed output of 1.15 million KW, or an average yearly output of 13.5 million KWH. At the end of the second year after the high dam goes on stream, the income from the two stations' power generation

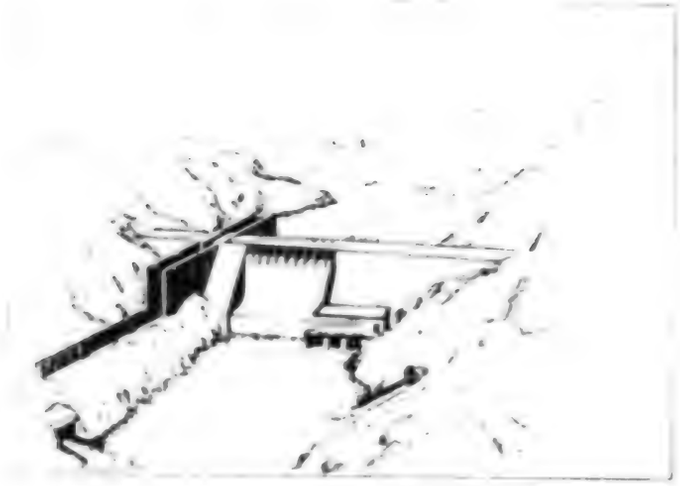
can earn enough for the final investment. After the Tianshengqiao two-step hydropower complex is built, not only will Guizhou's industrial and agricultural production be ample, a powerful current will be fed into the South China power grid and power will be supplied to Guangxi and energy-starved Guangdong, assisting sister provinces and regions in the building of the four modernizations.

Engineering and technical personnel of the 9th Hydroelectric Engineering Department, Survey and Planning Institute, Ministry of Water Conservancy and Power make on-the-spot inspection on the Nanpan River during early phase of the project (August 1973).

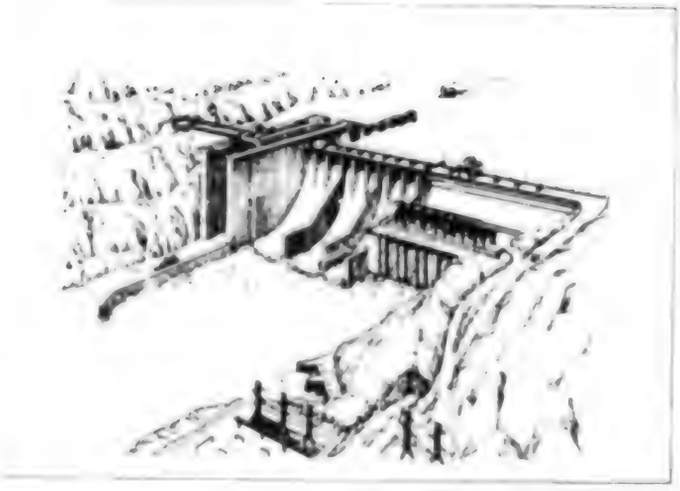
Drilling in the middle of the river.

Leigongtan--the first big rapids on the upper reaches of the Nanpan River. This 10-kilometer stretch of the river has many shoals and rapids with a natural drop of 181 meters, a rich waterpower resource made use of by the Tianshengqiao Hydroelectric power complex.

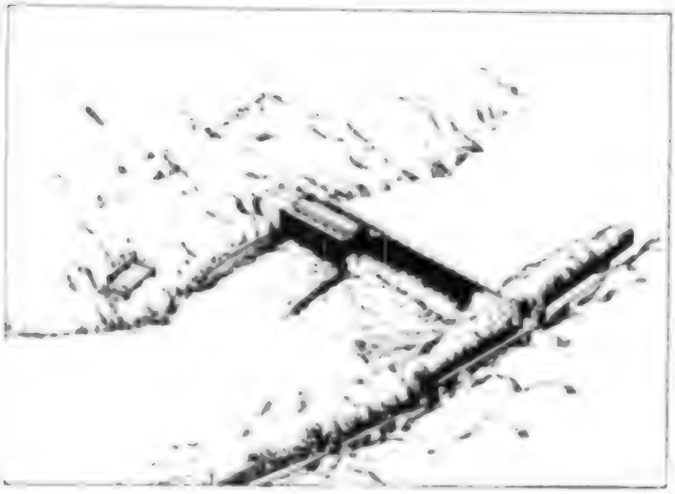
Drilling machinery bores holes on axis of the dam.



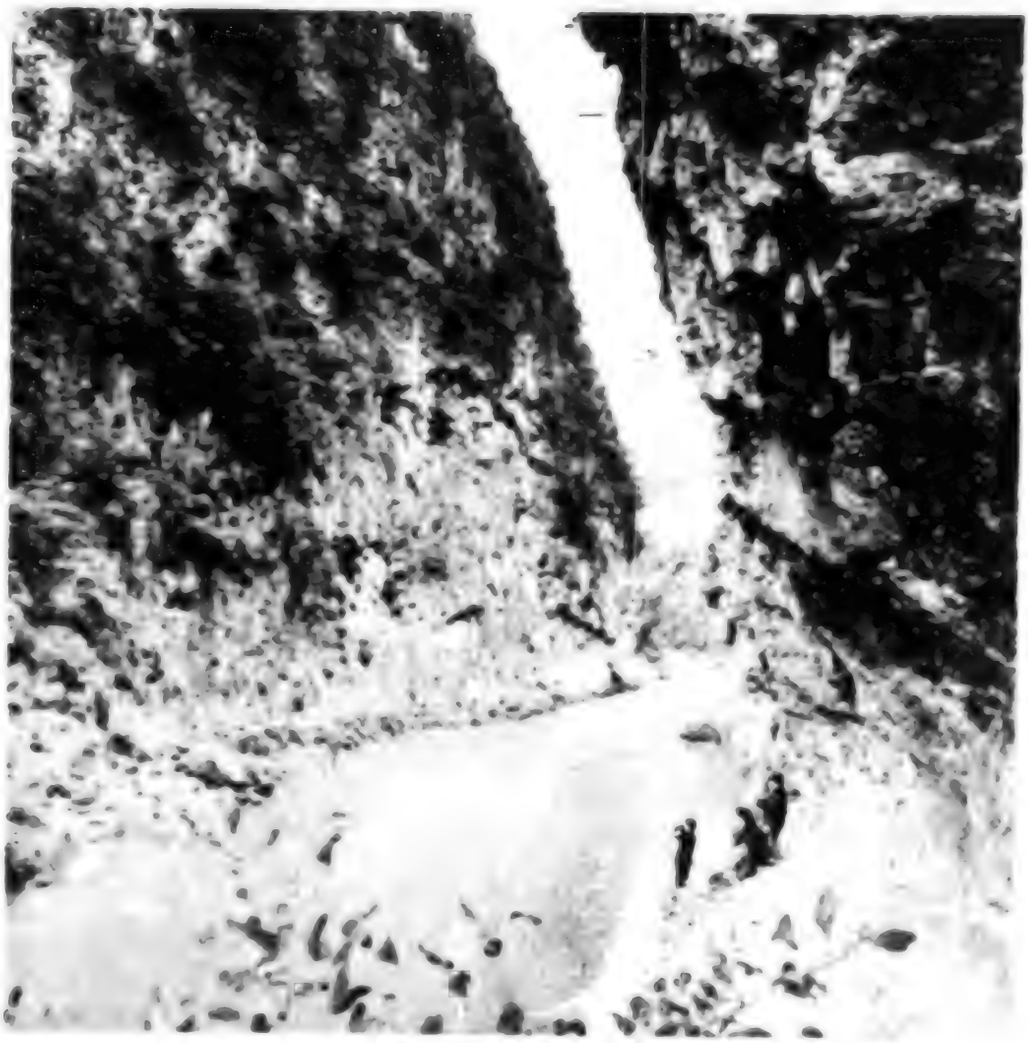
Longtan hydroelectric power station



Yantan hydroelectric power station



Datengxia hydroelectric power station



The famous Tianshengqiao ["Natural Bridge"] Gorge on the Nanpan River, for which the Tianshengqiao hydropower complex is named.

Geologists work day and night conducting surveys in the tunnels.

Site of the Tianshengqian upper dam.

CSO: 4013/138

ETAN HYDROPOWER PROJECT SPURS INDUSTRIAL, AGRICULTURAL GROWTH OF REGION

Beijing MINZU HUABAO in Chinese No 1, 1982 pp 26-27

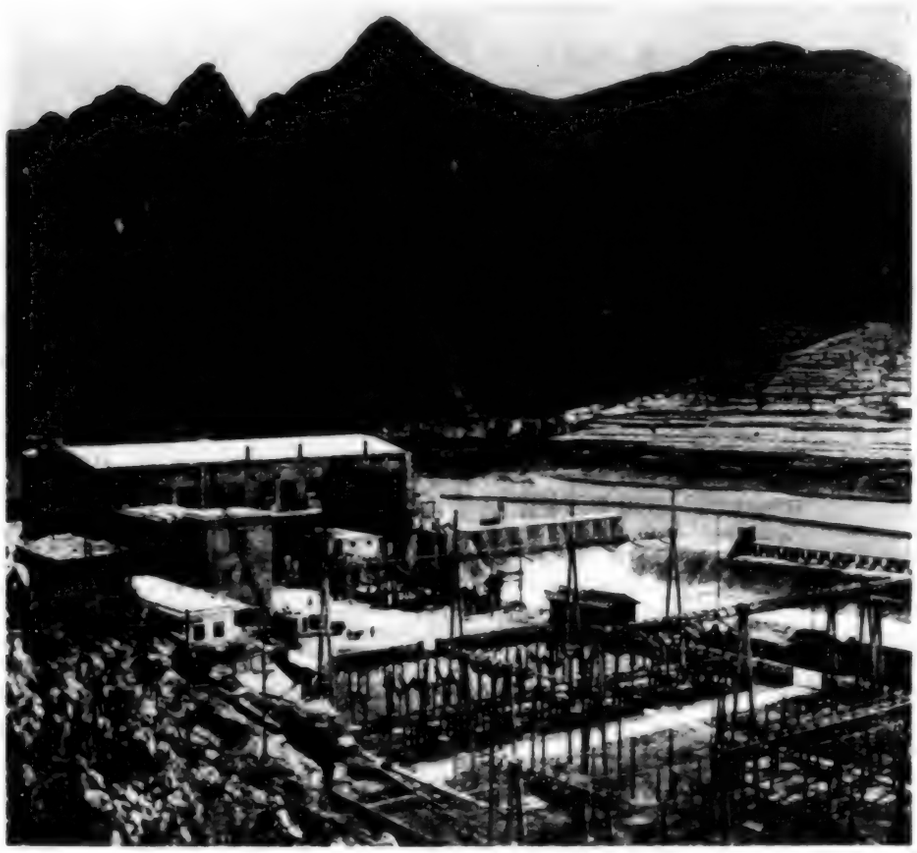
[Article: "The 'Jewel' on the Hongshui River"]

[Excerpts] Located in Hongdu commune, Xincheng County, Guangxi Zhuang Autonomous Region, on the middle reaches of the Hongshui River, the Etan hydroelectric power station was begun in 1977 and completed and began to generate power in April 1981. The Etan hydroelectric power station is a run-off type, low waterhead medium-sized power station. It has an installed capacity of 60,000 KW for an average yearly power output of 328 million KWH.

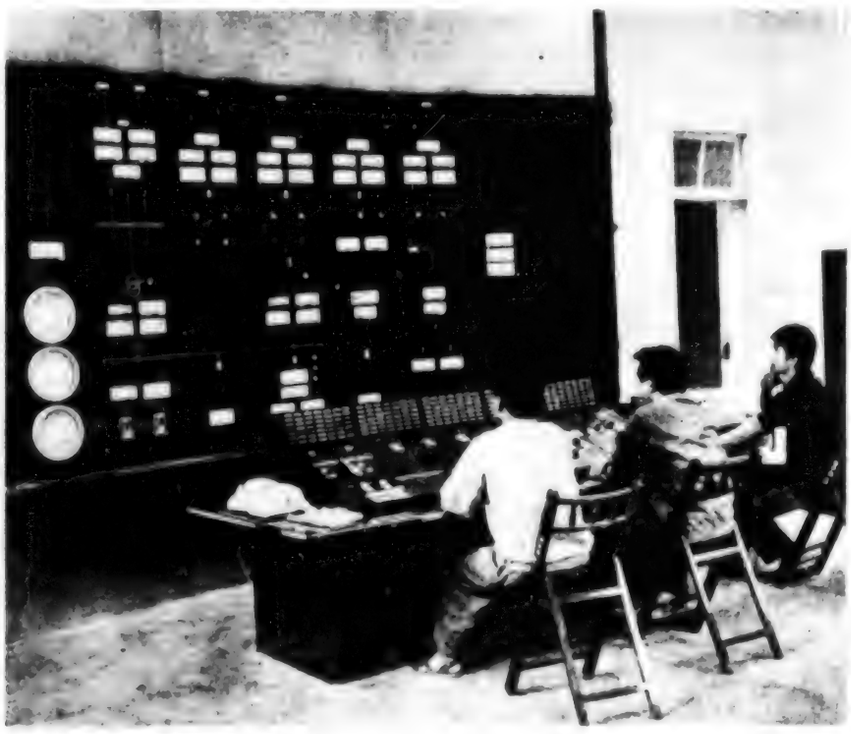
The main structure of the Etan hydroelectric power station includes a water diversion canal, a water intake gate, a main machinery building and a switching station. The main machinery building is located on the downstream side of the dam on an overhanging cliff. With a construction area of only 5,000 square meters, work was very difficult due to the restricted work area and transportation problems.

By strengthening construction management and promoting technical innovation, some 670,000 yuan were saved for the state and construction time was accelerated. This assured the completion of the construction and installation of the main parts of the project according to timetables and design requirements.

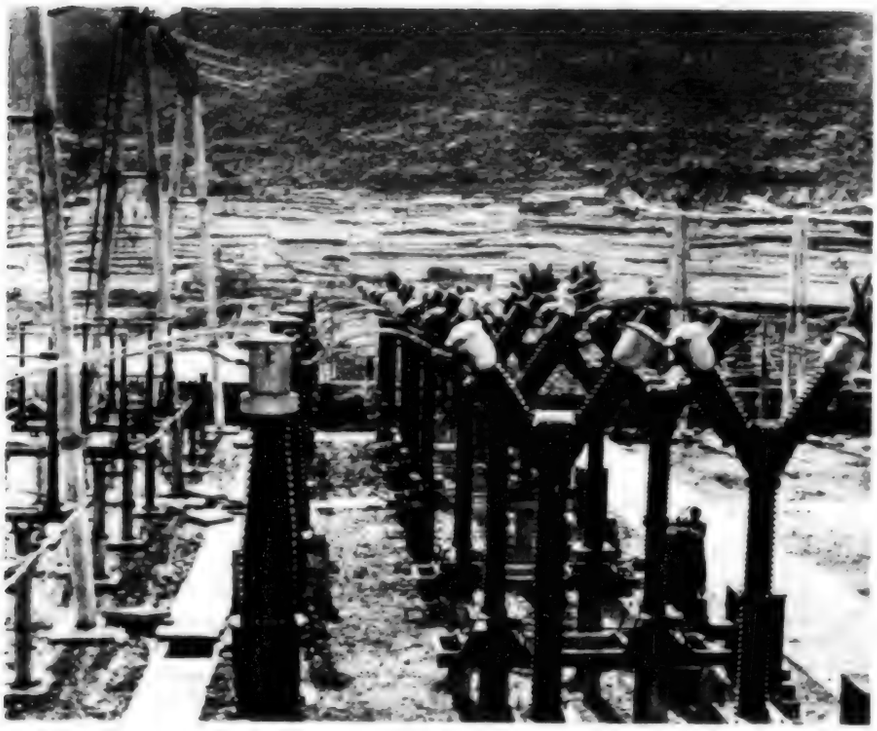
The successful construction of the Etan hydroelectric power station marks another step in amassing experience in the harnessing of the Hongshui River. The project will have a major impact on the growth of industry and agriculture in Guangxi and on the buildup of the minority regions.



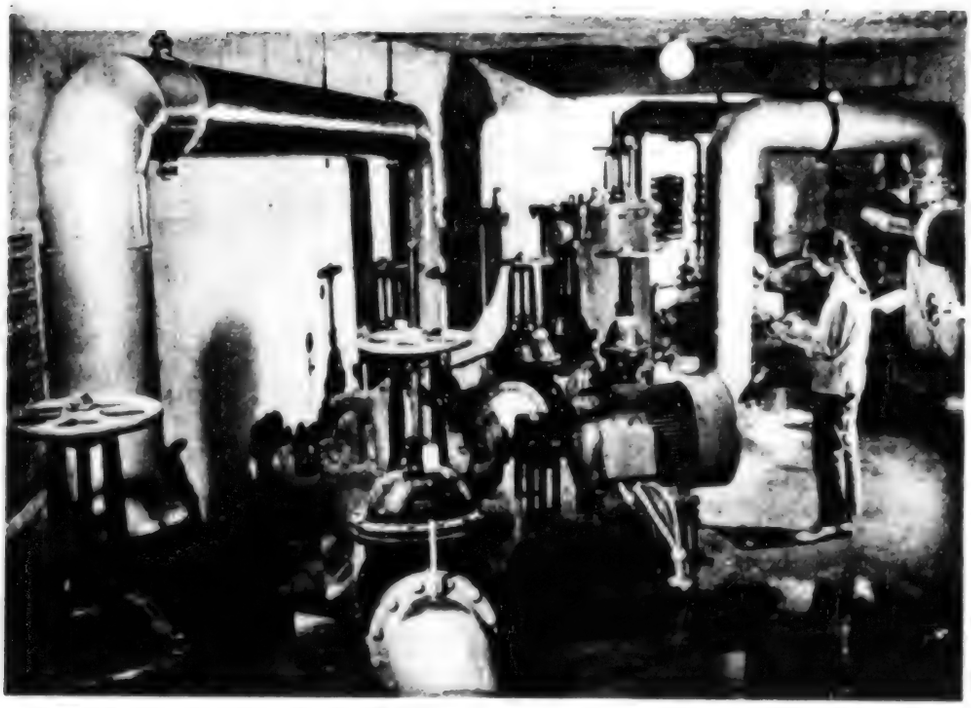
The Etan hydroelectric power station on the middle reaches of the Hongshui River.



The central control room of the power station.



A section of the switching station.



Generator cooling pump room.

CSO: 4013/141

LACK OF RAIL TRANSPORT MAKES SLURRY PIPELINES MORE ATTRACTIVE

Taiyuan JISHU JINGJI YU GUANLI YANJIU [RESEARCH ON THE ECONOMICS AND MANAGEMENT OF TECHNOLOGY] in Chinese No 1, 31 Mar 82 pp 27-29

[Article by Zhang Deang [1728 1795 2491]: "Development of Pipeline Transportation--A Look at the Problem of Transporting Shanxi's Coal Energy"]

[Text] Coal is China's main energy resource, accounting for about 70 percent of the country's energy consumption. Consequently, China's energy policies are concerned chiefly with coal. Vigorous all-round development of Shanxi coal and the building of Shanxi into a powerful coal energy base would be a major measure for solving China's lack of energy over the near and medium term. Right now Shanxi's coal output accounts for one-sixth of the national output amounting to somewhat more than 120 million tons. However, for a long time the problem of coal transportation has been lacking a solution. This has limited the growth of Shanxi's coal output and has adversely affected the building of Shanxi's coal energy bases.

China is extremely short of railroad capacity for the transportation of coal. Transportation of coal accounts for somewhat more than 38 percent of the total volume of goods transported by rail nationally. Shanxi's coal supports 26 provinces and municipalities nationally, and during the past 30 years Shanxi Province has shipped a cumulative total of 760 million tons of coal outside the province, amounting to about half the national volume shipped. In 1979, 68 million tons of coal were shipped, accounting for about 80 percent of the total volume of goods shipped over Shanxi's railroads. As a result of the shipment of coal in one direction, the deadheading rate for railroad cars reached 6:1, economically an extremely irrational rate. Furthermore, Shanxi regularly had more than 10 million tons of coal in inventory that could not be shipped outside the province. For medium-size and small coal mines it was particularly true that "transportation set production," or even forced a halt to production. Serious stockpiling of coal has become a natural condition, and the annual natural loss has been estimated at more than 1 million tons. Not only is a large amount of resources and manpower wasted, but environmental pollution is created. The Party Central Committee requirements called for a coal output in Shanxi of 175 million tons (800 million tons for the nation as a whole) by 1985, and 600 million tons (2 billion tons for the nation as a whole) by the year 2000, but the problems are extremely pronounced for transportation capacity. The trunk lines presently used to transport coal

outside the province are the Beijing-Baotou line, the Shijiazhuang-Taiyuan line, the Nan-Tong-Pu line, and Beijing-Taiyuan line, and the Taiyuan-Jiaozuo line, with a coal transportation capacity totaling 60 million tons per year. By 1985, as a result of technical improvements to these five lines such as multiple tracking and electrification, and with the addition of newly built Han-Chang and Hou-Xi lines, coal-carrying capacity will increase by only 1.3 tons [presumably 1.3 million tons was intended]. Realization of the afforestation plans will cost the country an investment of more than 1.5 billion yuan. Even if newly built lines are added between Yangquan and Jinan and between Datong and Baotou, by 1999, their coal-carrying capacity will not be more than 150 million tons. Figuring a 600 million coal-carrying capacity by the year 2000, the coal transportation problem will remain an extremely serious one. For some time to come Shanxi coal transportation growth needs will be unable to be satisfied. Therefore, when building the west Shanxi coal energy base, coal transportation is one of the major problems to be faced. Coal transportation is a major integral part of energy policy, and it is also a priority requirement for development of coal energy bases. How to select an economically rational coal energy transportation method for Shanxi is an urgent problem currently facing us.

In the field of coal energy transportation, apart from the building of pithead power stations, high-voltage power transmission lines and railroad transportation, foreign countries are in the process of building a new transportation method--namely, pipeline transportation. As coal production increases and coal assumes a steadily increasing proportion of the world's energy consumption structure, this new method of transporting coal has attracted serious attention in an ever increasing number of countries.

As a method of transporting large quantities of coal alone, the economic benefits of pipeline transportation are particularly outstanding. In this method of transporting coal, the coal is pulverized into extremely fine particles (particles 1.2 millimeters in size being no greater than 2 percent; those ranging from 1.2 millimeters to 44 microns in size accounting for 78 to 79 percent, and those smaller than 44 microns in size accounting for 19-20 percent). The coal is mixed with water at a 1:1 ratio to form a coal slurry. After being pumped through the pipeline, the water is drained off and the coal is dried to supply the needs of power plants or the marketplace. Since construction of the first pipeline in the United States during the 1950's, pipelines have had a history of more than 20 years. Examination shows their major advantages to be as follows: 1) The transportation route can be shortened. The pipeline grade may be as much as 16 percent (railroad maximum is 3 percent), so the pipeline can follow the topography, shortening distances by about 25 percent as compared with railroads. 2) The required investment is comparatively economical. For the Black Mesa pipeline, for example, figured in terms of a current construction cost of $39 million, the investment could be recovered in 8 to 10 years. If existing rail lines were to be used, new construction of feeder lines would require an investment of $140 million. Soviet data reports an investment of 500,000 rubles for every kilometer of railroad track laid, while the cost of laying a pipeline is only 80,000 rubles per kilometer. 3) The transportation costs are low. The cost of transporting coal via the Black Mesa pipeline is one-third the cost of shipment by ordinary

railroad cars. 4) Steel is saved. The newly designed American pipeline running from Wyoming to Arkansas used 450,000 tons of steel, while renovation of the rail line and locomotives and cars would have required 850,000 tons of steel, an almost 50 percent difference. 5) Little power equipment is required. The Wyoming to Arkansas pipeline's total power requirement is 273,000 horsepower. Railroads would require 210 internal combustion engines with a total power requirement of 630,000 horsepower.

In summary, the economic benefits derived from pipeline transportation of coal are influenced by a series of technical and economic factors such as transportation distance, transportation volume, coal quality, etc. Relevant research and the actual practice of certain countries in using pipelines have shown that use of pipelines to transport coal is technically feasible and economically advantageous. For a 457-millimeter pipe resistance damage is only 0.8 percent, and for a pipe 720 centimeters in diameter the resistance damage is only 0.6 percent. Abrasion and corrosion of pipelines is less than 1 millimeter in 10 years, for a utilization efficiency of 99 percent; moreover, investment is economical, costs are low, construction time is short, and the amount of land taken is little. As a result, with the appearance in the United States of the first pipeline in the 1950's, and success during the 1970's with the second Black Mesa coal-carrying pipeline, widespread interest was aroused in all countries of the world. The United States is now in the process of planning the new construction of seven coal-carrying pipelines with a length totaling more than 11,000 kilometers and an annual carrying capacity of more than 120 million tons. The USSR is also getting ready to build a coal-carrying pipeline from Kuznetsk to Novosibirsk to transport 4.3 million tons of coal annually. It will also build a 4,000-kilometer-long coal-carrying pipeline from its Far Eastern coal region to the Urals and the European part of the Soviet Union to transport between 30 and 50 million tons of coal annually. In addition, Italy, Canada, and some countries of northwestern Europe are also planning to build coal-carrying pipelines.

On the basis of concrete circumstances in Shanxi, making use of advantages and avoiding disadvantages, positively developing pipeline transportation to solve the longstanding problem of bottlenecks in shipment of coal energy out of Shanxi should be placed on the agenda. Objectively speaking, favorable conditions also exist in Shanxi for the development of pipeline transportation.

1. Shanxi's coalfields are geographically located in the heart of China's industrial base. They are 500 to 700 kilometers from North China's major industrial cities, Beijing, Tianjin, and Tangshan. They are 1,752, 832, 922, and 1,049 kilometers, respectively, from the ports at Dalian, Qinhuangdao, Qingdao, and Lianyungang, a suitable distance for pipeline transportation. For direct-line distances between several coal-producing areas of Shanxi Province and major cities in North China, the northeast, East China, and central China, please see the attached table. Viewed in terms of investment index per unit of coal volume transported, transportation in any given year of 5 million tons over a distance of 500 kilometers or more, or transportation of 10 million tons over a distance of 300 kilometers or more would make investment in pipeline transportation more economical than in rail transportation.

A comparison of coal transportation by pipeline with means of carrying electricity shows that the higher the heat value of coal, the greater the benefits from pipeline transportation of coal. Shanxi's coal has such an advantage (this matter will be discussed separately below). Analyzed in terms of transportation costs, in addition to the effect on pipeline coal transportation costs of the coal's heat value, the greater the distance shipped, the more rapidly costs fall.

2. Shanxi is located in the loess highlands at about 1,000 meters above sealevel, while neighboring Hebei, Henan, Beijing, and Tianjin are at an elevation above sealevel of several tens of meters. Because of the great drop in elevation, the cost of building railroads is great, amounting to 2-2.5 million yuan per kilometer. By contrast, pipeline transportation can shape itself to the terrain, thereby reducing the number of booster stations required along the way, for a saving of investment funds. If Shanxi's Pingshuo coalfields were to be developed for the hypothetical transportation out of the province of 10 million tons to power plants located in the Tianjin-Tangshan-Qinhuangdao area, and a 720-millimeter pipeline extending 570 to 600 kilometers in length were built, investment for the newly built pipeline could effect a saving of about one-half as compared with the building of a railroad, and expenditures for transportation along the course of the pipeline would be 30 percent lower than for a railroad.

3. Shanxi Province's machinery industry has been operating for more than 50 years and has a fairly strong production capacity. In pipeline transportation of coal, it is steel pipe that is used in the largest quantities, and steel pipe rolling machines are one of the strengths of Shanxi's machinery industry. The Taiyuan Heavy Machinery Plant produces 140 to 400 millimeter seamless pipe rolling machines. The Taiyuan Mining Machinery Plant produces 219 millimeter diameter directly welded seamed pipe rolling machines and 1,020 millimeter diameter rotary pipe welding machines. This plant's 1020 (1420) maximum millimeter rotary pipe welding rolling machine has gone into production in the Sha City Steel Tube Plant. Although the performance of rotary welded pipe is not as good as that of straight seam welded pipe, it can be used for transporting coal. Relevant analysis shows that the cage mills and rod mills used to make coal slurry for pipelines can also be made in China, although the capability is small. However, as compared with those used abroad, apart from the large volume and high efficiency of the foreign mills, no special fabricating technology or techniques are required; therefore all that is needed for the domestically produced mills is some improvements, and they will be entirely serviceable. The Shanxi machinery industry with its powerful production capacity will also surely be able to provide powerful assurance for the equipment needed in pipeline transportation.

4. Shanxi, located in the loess highlands, has an annual rainfall of between 400 and 500 millimeters in most places. The annual normal flow for the province as a whole is 10 billion cubic meters. During 1978, agriculture and industry used 5.5 billion cubic meters of water (4.4 million cubic meters of which was used by agriculture), and a strong belief exists that insufficient water is available for agricultural use and that water for industrial use is also in fairly short supply. The area of cultivated land in the province accounts for 25.04 percent of the province's total land area and averages

2.4 mu per capita. In high-density population areas, the amount averages only several fen per capita. Pipeline transportation mixes coal that has been pulverized into fine particles with water at a ratio of 1:1 to produce a coal slurry for movement through pipes. As compared with other transportation methods, it represents a saving in use of water. In coal liquefaction, for example, the ratio of coal to water is 1:2. When coal is used to generate electric power, the ratio of coal to water is 1:8. In addition, pipeline transportation is continuous and is not affected by climatic conditions. When the pipeline is buried beneath the plow line or the frozen soil layer, in particular, virtually no farmland is used. Consequently, for Shanxi Province, where water resources are fairly scarce and the cultivated land area is limited, to avoid these shortcomings, development of pipeline transportation is relatively favorable.

5. Shanxi's coal quality is excellent. It is low in three ways (low ash, low sulfur, and low phosphorous), high in one way (high basic volume of heat when burned), and wide in one way (wide in its uses). The "one high" is particularly important. Except for a small amount of lignite and peat, the 202 billion tons of proven coal reserves in Shanxi Province produce heat at 5,300 - 8,000 kilocalories per kilogram. The carbon content is high and the ash content low for Datong coal; it contains few impurities and produces as much as 7,500 kilocalories per kilogram, 50 percent more than the national average of 5,000 kilocalories per kilogram. Research has shown that costs of shipping by rail and by pipeline are very much affected by heat output. The cost of shipping 6,000 kilocalorie coal is 58 percent lower than cost of shipping 2,500 kilocalorie coal (converted to standard coal for calculation). If an electric power plant with an installed capacity of 2 million kilowatts uses 7,000 kilocalorie coal, a 478 millimeter pipe can supply its needs. If 3,000 kilocalorie coal is used, 720 millimeter pipe will have to be used. From this it can be seen that the thermal value of coal is directly related to the economic effectiveness of the means of transportation. The high thermal value of Shanxi's coal is particularly beneficial economically for development of pipeline transportation.

In the wake of the building of Shanxi coal energy bases, a steady increase will inevitably occur in the volume of coal shipped everywhere in the country. One example was the shipment of 9.81 million tons more coal outside the province in 1980 than in 1979. Development of pipeline transportation would not only ease the transportation shortage regarding Shanxi's rail lines, but would also relieve pressure on the Longhai, the Beijing-Hankou, and the Tianjin-Pukou trunk lines as well as on the ports of Qinhuangdao and Qingdao. If pipeline transportation were used as a new means of transporting coal, because of its numerous advantages as well as the favorable conditions Shanxi possesses, its proper development in Shanxi in coordination with railroads and other forms of transportation, each one reinforcing the other, would doubtlessly be a major way in which to solve Shanxi's coal transportation. Of course, pipeline transportation also has shortcomings, the most glaring of which are that transportation goes in only one direction and that, once built, the transportation capacity cannot be readily expanded. In these aspects, it is not as advantageous as rail transport. Moreover, economic effectiveness indicators in general can only provide an overall conception and an overall trend regarding the economics of pipeline coal transportation; one cannot use them to assess and decide specific engineering projects. Therefore, it is

also necessary to take a conscientiously cautious attitude about Shanxi development of coal pipeline transportation to help accelerate the construction of Shanxi's coal energy bases, and to take full advantage of the role of Shanxi's coal energy bases to make a greater contribution to China's four modernizations construction.

Direct-line distances between several major coal-producing areas in Shanxi Province and major cities in North China, Northeast China, East China, and Central China

Places	Distance (km)	Places	Distance (km)
Datong-Shenyang	870	Datong-Beijing	270
Shuoxian-Tianjin	320	Yangquan-Wuhan	830
Yangquan-Jinan	330	Yangquan-Shanghai	1050
Lucheng-Nanjing	720	Changzhi-Hangzhou	930

9432
CSO: 4013/72

CONFERENCE REITERATES NEED FOR MORE COMPREHENSIVE USE OF COAL

Beijing NENG YUAN [JOURNAL OF ENERGY] in Chinese No 2, 25 Apr 82 p 4

[Article by Sima Chen [0674 7456 5256]: "Ministry of Coal Industry Convenes Conference on Comprehensive Use of Coal"]

[Text] In order to put into effect the spirit of the CCP Committee directive on coal processing and comprehensive use, and to implement a program of "change in the product composition of the coal industry, bring to an end the old era of sole production by the coal industry of raw coal, and to open a new era of comprehensive operations and comprehensive use," the Ministry of Coal Industry convened in Beijing a conference on comprehensive use of coal. The conference was attended by 320 people including those in charge in the coal bureaus and bureaus of mines in each province, engineering technicians, CCP Committees from pertinent ministries, experts from institutions of higher education and research units, teachers, and researchers. Comrades in charge at the State Planning Commission, and the minister and deputy minister of the Ministry of Coal gave speeches at the conference. Conference attendees studied pertinent directives from CCP Committee leadership comrades, gave briefings on experiences, read scientific and technical papers, reported back on scientific and technical accomplishments, formulated a long-range plan for coal processing and use and a 1982 annual plan, and arranged for future work.

The conference acknowledged that in recent years the country has done a great deal of work in coal processing and comprehensive use of coal, and has won fairly good accomplishments. Examples include comprehensive use of coal rock waste and bone coal, the shaping of pulverized coal, the high speed coking and gasification of lignite and oil shale, multiple uses of humic acid, and the extraction from coal, coal rock waste and bone coal of chemical products, etc.

The conference clearly pointed out that the coal industry's future program for processing and use will be as follows: to take coal as the key link in comprehensive operations. Low quality will be turned into high quality, and single products will become varied products. There will be a change from concern only about production and no concern about use to concern about production and use as a total process, with development from primary processing to high quality processing, thereby gaining maximum economic benefits and savings in energy for the coal industry. The conference demanded a change in the way of doing things from the guiding mentality to work assignments, placement of coal processing

and comprehensive use on the daily work agenda, and reflecting the following in planning and arrangements: (1) Formulation of long-range plans that take coal as the key link in development of economic diversification for a gradual building of various kinds of thermal electric power and coal chemical industry bases, and taking the course of integrated enterprises in coal processing, use, sales, and the manufacture of coal burning devices. (2) Full use of coal rock waste, bone coal, low grade coal, and such fuels of low thermal value to conserve energy resources. Examples are continued promotion of fluidized-bed boilers and improvements in associated projects to make the most of benefits in the shortest possible time. A halt by 1985 to the use of low efficiency boilers in centrally provided for and local coal mines. (3) A good job of coal processing to create conditions for society to conserve energy. (4) Development of urban and mine area coal gas and improvement of the thermal energy utilization rate. Carrying out plans for the use of gas and coal gas as fuel in 12 cities and nine mining areas one after another. (5) Building a specialized corps with professional understanding and skills that can be used in multiple ways. (6) Adopt economic policies that encourage and support development of comprehensive uses of coal.

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NEED FOR OVERALL PLANNING FOR SHANXI COAL UNDERSCORED

Taiyuan JISHU JINGJI YU GUANLI YANJIU [RESEARCH ON THE ECONOMICS AND MANAGEMENT OF TECHNOLOGY] in Chinese No 1, 31 Mar 82 pp 15-17

[Article by Guo Yansheng [6753 7159 5116]: "Major Contradictions Requiring Attention in Studying and Formulating Construction Plans for Shanxi Coal Energy Bases"]

[Text] In connection with the building of Shanxi coal energy bases, in March 1981 the Shanxi Provincial Science Society, the Society for Research on the Modernization of the Economics and Management of Technology, societies for railroads, electrical machinery, and environmental protection, and the Shanxi Social Sciences Institute convened an academic discussion meeting on the Shanxi coal energy base. Many of the viewpoints expressed at the discussion meeting received acknowledgment from the State Economic Research Center. This acknowledgment was given expression in the "Summary of the First Testimonial Meeting on Shanxi Coal Development Problems." Specifically, this included: 1) being able both to satisfy construction and necessary export needs and to assure coordinated development of the Shanxi national economy and commensurate improvements in the people's material and cultural standards; 2) it affirmed that transportation, electric power and water resources are limiting factors in Shanxi's coal development that must be developed along with coal; 3) it affirmed a scale and speed of development of 200 million tons by 1990 and 300 million tons by 2000, and a cancelling of the concept of 300 million tons by 1990 and 400-600 million tons by 2000; 4) it made clear implementation of the principle of material benefits in the realm of finances and goods to compensate labor expended by the people of Shanxi.

February this year, Shanxi Province again convened a "Comprehensive Economic Planning and Study Meeting on Shanxi Province's Energy Bases." Although the circumstances studied were identical with those of last year, a more thoroughgoing study was made, and the plans put forward were as follows:

Mining and transportation, pithead generation of electricity, secondary energy source methanol, pipeline transportation, gasification, coking, etc, were each looked into and testimony given. But how to correlate these things to Shanxi's realities became a major contradiction in making the most of advantages while avoiding disadvantages. Consequently, performing an economic evaluation and studying different plans did not mean negating any plan, but rather finding which plan was best geared to actual circumstances in Shanxi. These realities

involved both a need to fit in with national strategic objectives and a need for comprehensive study of Shanxi's economic plans. Since the economy is a total entity, a slight move in one part of it might affect the situation as a whole; the digging of coal is not an isolated individual indicator. For example, statements by experts acknowledged that on the basis of an economic evaluation, the transportation of coal by pipeline would be economically beneficial for the people of Shanxi, but some water would have to be sacrificed. However, Shanxi has a drought 9 years out of 10, and this would mean further impoverishment of resources, so water could not be sold. Another example concerned transportation of coal by rail. The various lines necessary to connect several major coal mines with main rail arteries would range from 10 kilometers to several tens of kilometers. Shanxi Province cannot sustain such an investment at the moment, and railroad units were of the opinion that this was a regional coal transportation matter, so they would not invest funds in it. The secondary energy resource, methanol, bears on both coal and the chemical industry. Coal units believed it to be chemical industry production, and the chemical industry considered it coal development. To go the coking route also entails recovery by the chemical industry and coking coal export. Furthermore coking coal requires bringing the ash content down to specifications and, additionally, no transportation is available for export. All these matters bear on investment of funds. The provincial Planning Commission put forward several views, one of which was for the state to make the investment. Another was to provide a policy that would maintain a reasonable price for Shanxi coal so that the people of Shanxi would be able to benefit.

On the basis of the foregoing circumstances, research on a comprehensive economic plan for energy is extremely necessary. Now the issue is formulation of a plan. In making a comparative selection of these plans, it is necessary to direct attention to the main contradictions. These major contradictions arise from the realities in Shanxi; they are not problems caused by the plans. A plan that treats Shanxi's realities in the aggregate is best. If a plan is considered best in terms of the country as a whole or is workable throughout the world but it does not suit the realities in Shanxi, it cannot be considered the best plan. The plan may not be divorced from reality; it should both incorporate advanced foreign production technology and be linked to current realities. How any given country puts it into effect is not pertinent. We have adopted a dogmatic attitude in this regard. At one time we regarded the Soviet economic model as the standard model and ignored the basic situation in our own country of a backward economy and extremely unbalanced levels of development. Thus, it is necessary to give attention to the main contradictions. If the main contradictions are properly grasped, a theoretical basis will exist for formulation of a line and strategic objectives. If the main contradictions are grasped incorrectly, inevitably mistaken choices of lines and strategic objectives will be made that will leave a legacy of trouble for 10,000 years.

If such is the case in selection of plans, the same is true in the case of a political party and a country. The "Decisions" of the Sixth Plenary Session pointed out that "Once the socialist transformation is substantially complete, the main contradictions requiring our solution will be contradictions between the constantly increasing material and cultural needs of the people and backward social productivity. The focus of party and national work must be shifted to socialist modern construction, which is at the heart of economic construction."

we must greatly develop social productivity, and gradually proceed from this foundation to improve the people's material and cultural life."

This is to say that once China's socialist transformation is complete, an incorrect grap of the main contradictions would create serious mistakes. In terms of Shanxi's coal development, it is likewise necessary to grasp the main contradiction between development of coal production while simultaneously raising the people's standard of living. When this contradiction is grasped, the enthusiasm of the people of Shanxi will be high and development of coal production will be rapid. This can bring about more beneficial effects on national economic development. Right now, in the building of Shanxi coal energy bases, we must bear in mind that once China's socialist transformation is complete, an incorrect grasp of the main contradictions would create serious mistakes and mean serious losses for the national economy. In formulating plans, and in selecting strategic objectives and ways to achieve them, it is necessary to grasp firmly the main contradictions in improving the material and cultural levels of the people of Shanxi in order to avoid the past mistakes created by failure to take account of realities that entailed losses for the country and the people.

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NATION'S ENERGY DEVELOPMENT PLAN PLACES HEAVY EMPHASIS ON COAL INDUSTRY

Beijing RENMIN RIBAO in Chinese 19 Mar 82 p 5

[Article by Chen Fujin [7115 4395 0093]: "Several Questions on Developing Production of the Coal Industry"]

[Text] Coal is a common source of energy in our nation. Coal constitutes 70 percent of exhaustible energy sources in our nation's energy resource structure. In the next few years, because petroleum and natural gas production can only maintain its present level, hydroelectricity will not be able to increase by a large scale, therefore, growth in the output of energy will mainly rely on coal. Coal is the key in the near-term growth of energy resources.

Hastening the development of the coal industry requires a correct technical and economic policy. The following problems have to be conscientiously studied and solved.

Grasping Tightly Technical Improvement of Old Mines

Technical improvement of old mines can increase the production of coal and improve the technical standard of coal mines, it can also change the present situation of an insufficient amount of heavy industrial tasks so that our nation's economic development can be maintained at a fixed rate and conditions can be created for future national economic development.

Technical improvement of old mines has a great potential to increase output. According to statistics, from 1976 to 1979, uniformly equipped coal mines produced a total increase of 77,800,000 tons of raw coal. Among them, those mines that were included for technical improvement produced an increase of more than 40 million tons. Compared to building new coal pits of the same scale, in general, the investment was 30 percent less, and the time required to begin production was shorter by one-third. Now, although the productivity of the nation's coal mines is large, but generally speaking, the technology and the equipment are old and out-dated. The existing enterprises have a low efficiency. The quality of products is poor. Energy consumption is high, and there are many accidents. Technical improvement of old mines is a long-term technical and economic policy. As long as existing coal enterprises have a rich reserve and as long as their technical and economic conditions allow, they should all carry out technical improvements, increase the output of coal, and improve the situation at the mines.

Technical improvement of mines mainly involves improving the distribution of exploitation, improving mining technology, renovating mining equipment, improving lifting and transport systems at the mines, perfecting safety measures, increasing washing and selection capacities, and paying attention to comprehensive utilization. Through such technical improvements, productivity can be increased, the relationship between mining and digging can be further coordinated, safety conditions can be improved, and comprehensive technical and economic results can be obtained.

Distribute the Construction of Coal Mines Well

The distribution of construction of coal mines must consider resources, geological conditions and traffic conditions, and it must be aimed at producing economic results. It must also consider the balance of energy resources in the region, and it must be closely coordinated with thermal power stations and long distance transportation should be reduced as much as possible.

Viewing our nation's situation during the "Sixth Five-Year Plan" and the "Seventh Five-Year Plan", plans to develop energy resources must emphasize the hastening of the development of the coal resources in Shanxi so that an energy resource base oriented towards the whole nation can be established. Shanxi has rich coal resources (known deposits constitute one-third of the total for the whole nation). The varieties--coking cola, coal for power generation, and anthracite--constitute one-half of the totals for the whole nation. They are deposited at shallow depths (generally from 200 meters to 500 meters). The coal seams are stable. Developing coal mines in Shanxi conserves investment, the results are quick, and the same amount of manpower, material power and funds can produce a rate of development and economic results two to three times those in the several provinces south of Changjiang. Estimates indicate that because the cost of coal production in Shanxi is low and the amount of heat generated is high, the total cost of shipping the coal to the major consuming regions throughout the nation is lower than that of shipping coal of other mines throughout the nation.

At the same time, we must hasten the construction of coal mines in the regions north and south of the Huai river and in southwest Shandong, develop the coal fields in the Northwest in a big way, continue to develop the coal fields in central and western Henan, and develop the coal fields in Guizhou. While building key coal bases, we must correspondingly build a group of thermal electricity bases and we must plan them uniformly along with traffic and transportation plans to better solve the problems of digestion of coal and future utilization of coal.

Establish Rational Construction Policies

In building the coal industry, we must combine the large, the medium and the small according to resources, funds and equipment. In view of the whole situation and in view of the future of the national economy, building a group of modernized large scale coal bases is absolutely necessary. Under the present situation, the nation urgently needs energy resources but investment is limited, therefore more medium and small mines should be built in the near term. This is

because building medium and small mines has many advantages when compared to the building of large mines. One is that the investment is less. The second is that the construction period is short. The third is that they can develop productivity relatively quickly.

At present, the scale of coal mines in our nation is already unsuited to the needs of national economic development. Also, 70 percent of the mines in construction are large mines, most of them will begin production 5 years later, and during the next few years, they cannot produce more. Under this situation, besides hastening the construction of large mines, grasping the construction of a group of medium and small mines is very necessary.

Support and Develop Regional Coal Mines in a Big Way

While developing uniformly equipped mines, we must greatly support and develop local coal mines. Local coal mines are an important force on the battlefront of the coal industry. The output of local mines at present already constitutes about 45 percent of the total output of coal of the whole nation, and local mines perform an important function in the national economy.

Developing local mines can fully utilize the resources of each locality. Among the more than 2,000 counties and cities in our nation, already more than 1,200 counties and cities have built their own coal mines. This has served greatly to improve the distribution of the coal industry, promote the development of regional industries and commune and brigade enterprises, and this has satisfied the needs of large industries and provinces and regions lacking coal.

Facts prove that local coal mines are the same as uniformly equipped coal mines. They are an important force in hastening the development of the coal industry. Especially in the present situation where uniformly equipped mines cannot develop greatly at the moment, we need more local coal mines to make more contributions. We must further develop the enthusiasm of each level to establish coal mines, use diversified joint operation, concentrate more capital, build more regular mines, and prevent uncontrolled digging and uncontrolled exploitation. In the course of construction, we must use our own cumulated capital, use mines to support mines, and develop continuously. We must tightly grasp technical improvements, build a group of backbone mines, improve productive and technical conditions, and we must continue to develop while firming up the presently available positions.

Develop Washing, Screening and Processing of Coal

Under the present situation, our nation has a shortage of energy resources and transportation is insufficient to handle its task. Therefore, developing washing, screening, processing of coal, increasing the proportion of raw coal for washing, and developing research and experimental work in coal gasification and liquefaction and comprehensively utilizing coal well are the urgent tasks at present to conserve energy resources, conserve transportation forces, and improve economic gain. They are also long range technical policies.

At present, our nation's industry has a high energy consumption and a low energy utilization rate. The rate of utilization of thermal energy from coal

is only about 25 percent. One important reason is that the degree of processing of coal is low, there are many waste rocks, the ash content is high, the varieties of coal supplied do not suit the needs, and over 80 percent of raw coal are directly utilized without processing.

The coal in our nation contains a lot of waste rock and there is a lot of wasteful transportation. According to incomplete statistics, over 60 percent of the commercial coal sold by the nation's uniformly equipped coal mines is raw coal that has not been washed, screened, or processed. This has created an ineffective load of more than 30 million tons in transportation for the railroads.

Now, our nation's work in washing, screening and processing coal already has a definite foundation and we have the ability to design and manufacture such processes. We must establish plans to develop washing, screening and processing by conducting surveys and studies on this foundation and gradually implement the plans. We must join with the machinery manufacturing departments to actively develop new types and highly efficient washing and screening equipment and washing and screening techniques. In the future, newly built mines must correspondingly build coal washing plants. Old mines that do not have any means of washing and screening must build additional washing and screening plants according to plan and according to the actual situation. Existing washing and screening plants must be technically improved to increase the capacity of washing and to increase products that suit the market.

Besides developing washing, screening and processing, we must also carry out comprehensive utilizaton well. Coal is not only an important energy source, it is also an important industrial raw material. We must conduct research and experimental work in gasification and liquefaction of coal well so that the thermal energy of coal can be fully utilized and the beneficial elements in coal can be retrieved as much as possible.

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HIGH PRODUCTION EXPERIENCE OF TOTALLY MECHANIZED COAL FACES IN CHINA

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[Article by Zhou Junsong [6650 0193 1529], Senior Engineer, Bureau of Mechanization, Ministry of Coal: "High Production Experience of Mechanized Coal Faces in China"]

[Text] In 1971, our country started its experimentation for totally mechanized coal mining. It has been eight years since totally mechanized coal mining formally began in 1974. Starting from the non-existence of any mechanized coal mining equipment, 135 totally mechanized coal mining faces have now been developed. Output from totally mechanized coal mining has increased from 760,000 tons in 1974 to 49.3 million tons in 1981. Many high production experiences have been established. Totally mechanized coal mining teams with daily output of 10,000 tons, monthly output 100,000 tons, 120,000 tons, and 190,000 tons, and yearly output of 1 million tons have appeared several times. Increasing numbers of totally mechanized coal mining teams have achieved the standards for ranking and their levels of performance have improved continuously. In 1979, 95 totally mechanized coal mining teams had an average unit output of 27,687 tons per month and a productivity of 10.12 tons per man-shift. The average monthly output of the three A teams was 49,512 tons and their productivity was 17.15 tons per man-shift. The No 3 mechanized team of Qishan had the highest annual output of 631,000 tons and a productivity of 20.39 tons per man-shift. In 1980, there were 145 totally mechanized coal mining teams in the country with an average unit output of 33,679 tons per month and a productivity of 13.27 tons per man-shift. A total of 33 teams achieved the standard for ranked teams. The average monthly output of the seven A teams was 58,604 tons and their productivity was 26.09 tons per man-shift. The Tongjialiang Mine No 1 team of Datong had the highest annual output of 928,600 tons and a productivity of 36.21 tons per man-shift. In 1981, there were 153 totally mechanized coal mining teams in the country and 49 teams achieved the standard for ranked teams. The average unit output of the mechanized mining teams in the country was 33,827 tons per month and the productivity was 13.7 tons per man-shift. The monthly output of the seven A teams was 68,701 tons and their productivity was 29.98 tons per man-shift. The highest coal output of 1,180,000 tons was achieved by the Yongdingzhuang Mine No 4 mechanized coal mining team of Datong, or a monthly output of 96,444 tons. The highest output level of A teams was achieved by the Tongjialiang Mine No 1 team of Datong with an annual output of 1,040,000 tons and a productivity of 43.49 tons per man-shift. The annual production of a totally mechanized coal mining team is equivalent to the output

of a medium coal mine, which is a first in the coal mining history of our country. The conscientious summarization and promotion of the experiences of our country's high production teams will undoubtedly raise our country's mechanized mining to a new level. What are the experiences of our country's high production mechanized mining teams? These are summarized below.

I. Organization and Establishment of Totally Mechanized Mining Teams Which Dare to Struggle and Which are Good at Struggling

A good mechanized mining team should be: First, it must have a leadership shift which has drive, knows how to organize, has good technical know-how, is good at directing, and can unite to engage in the struggle. The shift should have specialized cadres for coal extraction, machinery and electric power. Second, it must have a working army which is well versed to the handling and maintenance of various types of equipment, especially operators and inspection and repair workers for coal mining machines and workers who are familiar with electronics and hydraulic pressure. Third, there should be a definite number of old coal mining workers who are familiar with the maintenance of the roof and the top and bottom exits. No matter how good the roof conditions at the working faces are, there are always broken areas. Pulling down loose rocks on the roof, installing plates [beiban] and putting up wooden pillars are procedures which still cannot be avoided at mechanized mining faces.

How to organize and establish a totally mechanized mining team? Based on past experience, there are three ways: (1) System of Transfer and Establishment: This was the way adopted by many units during the initial period of team organization and establishment in 1974. At that time, the age and cultural level of team members were over-emphasized. The team members were transferred from various teams and various offices. Because the control of the selection process was not strict enough, persons were often transferred to become part of the mechanized mining team who had not had any underground experience or who were not suitable for mechanized mining work. Also, the persons came from various areas, with some of the teams put together from the more than 20 units at the mines, and they were difficult to direct. Under smooth working conditions, they were able to produce some coal. However, once difficult conditions were encountered, such as broken roofs, they often did not know what to do. With mechanized mining teams established in this manner, successes were extremely few. (2) System of Establishment From Existing Teams [this is paraphrased from the original term, chengjian zhi]: The best general mining teams at the mines were used as the foundation and mechanized mining teams were organized by transfer and "reconstruction." "Reconstruction" meant the reinforcement with a group of experienced mechanical and electrical workers, especially electronics and mechanical and electrical inspection and repair workers, and the elimination of a portion of the workers who were not suited for mechanized mining work. This type of mechanized mining team has a better team spirit, has the experience in general mining practices, and has a better understanding between the cadres and the workers.

The mechanized mining teams organized and established in this manner had more successes. For example, the No 1 mechanized mining team of Quantai was reconstructed from the largest general mining team at the mine. It achieved the name of A ranking team for three years in a row. The No 2 team of Guandi was

organized and established from the experience-rich No 4 coal mining team. It produced 770,000 tons of coal in 1980 and 826,000 tons in 1981. The No 5 mechanized mining team of Guandi was organized and established from the No 6 coal mining team which had established the highest level of unit production in the province three times using ordinary equipment. It used domestically produced supports and achieved success immediately with monthly output reaching 49,000 tons in the second month of production. The No 4 mechanized mining team of Yongdingzhuang was also reconstructed from the mine's better general mining team. It established a new highest annual output record in mechanized mining in our country of 1,180,000 tons in the second year of production.

(3) System of Establishment Through Competitive Selection [xuanjian zhi - literally would be system of selection and establishment or system of selective establishment, but such a translation would not differentiate the system from the first two. The translation given is based on the method of establishment described in the text.]: Based on requirements of a totally mechanized mining team, superior candidates are selected through examinations announced by the mine. The mechanized mining teams of the Wangzhuang Mine of Luan were organized and established in this manner. Based on initial experience, the results are also better. For example, the No 1 mechanized mining team of Wangzhuang was a newly established team. Using link type [jieshi] supports, it produced 500,000 tons of coal in 1981. Since not many teams have been established on this basis, insufficient experiences have been accumulated to judge their results. After the organization and establishment of a team, two types of education of the staff and workers should be regularly carried out. One is the ideological education. The second is the learning of the technical operation. Ideological education means the continuous improvement of the ideological awakening of the staff and workers and the establishment in them of a strict and careful style of working. Advanced equipment cannot be handled and made to demonstrate its superior capabilities without a team of staff and workers with advanced ideology and a strict and careful working style. The Party Committee of Kailuan's Tangshan Mine teaches the staff and workers to struggle for the working class of China, to fight for the glory of the Party and the fatherland, and to continuously think of the "new" and reach for the "high." The mechanized mining team of the mine has continuously exceeded 100,000 tons in monthly output several times, establishing at one time a record monthly output of 190,000 tons. The cadres of the No 4 mechanized mining team of Yongdingzhuang uses equipment purchasing contracts to educate the workers. They are taught the prices of each type of equipment and each spare part. If the equipment is not used properly, they will be letting the people down. This teaching is used to arouse the patriotic enthusiasm of the workers. The No 1 mechanized mining team of the No 10 mine of Pingdingshan has implemented the "three talk" movement. First is to talk of the fact that the use of mechanized mining equipment is the way the Party and the state show concern for the coal mine staff and workers. Second is to talk about the comparison between the new and the old mining methods. Third is to talk about the advanced levels of mining in the country and abroad to encourage the staff and workers to start a competition to gain the advanced level. The staff and workers should be educated to establish a strict and careful working style and conquor the "three hu" working style (careless, good enough, and not worry at all) existing among the troops. [translator's note: the hu in "three hu" is used here both for the word and its sound in Chinese. The three teams in parenthesis all have the same Chinese word or same sound.] At the same time, education on technical work should be

implemented to provide strict training. In this area, the No 1 mechanized mining team of Tongjialiang has done better work. They have adopted five ways of training: 1. Release-from-production training: Since the establishment of the team, release-from-production training has been carried out three times for a total time of nine months. 2. Persist with regular after-hour training: This training is carried out twice a week and 1.5 hours each time. Lectures are given by technical personnel on important areas and technical know-how. The voluntary spirit of the masses is launched. The work is done with planning and it has had a very large effect in improving the technical levels of the staff and workers. 3. Form working pairs with a teacher bringing along a student. 4. One goes out and another is invited in. 5. Technical competition is diligently conducted. The troops are regularly trained. And on-site demonstrations are given by the technical personnel. As a result of this technical training, the team has produced 45 technical crackajacks and 10 technical bests of its kind and 85 percent of the staff and workers have reached the requirement of being able to work independently.

II. Suitability of Support To Meet Condition of Working Face

Beside the quality of the troops, the suitability of the type of support used is also the most important factor. If the type of support is not suitable, no matter how good the quality of the troops may be, it would not be possible to achieve a high production or even to produce any coal at all. In the past when the output of several mechanized mining teams was not high, we simply placed the problems on the shifts and on the troops. This was not looking at the whole picture. Previously, the No 1 mechanized mining team of the No 10 mine of Pingdingshan used the K_{3-4} link type supports when mining the J_{5-6} coal seam. Because of its broken roof, the supports were not suitable and the average unit out stayed between 10,200 tons and 16,600 tons per month. Later in 1978, it changed to the use of the short beam-supporting protective supports in mining the similar Wu_{8-0} coal seam. In three years, it produced 2.1 million tons of coal and the highest annual output was 770,000 tons. The No 3 mechanized mining team of Pangzhuang used the ladder [daoti] supports when mining the No 2 coal seam of the Xiaoqiao Series. Because the supports were not suitable, its average unit output stayed at 22,000 tons per month over a long period of time. In 1979, it changed to the use of the long beam-supporting protective supports and its average unit output has reached 51,800 tons per month. The No 1 mechanized mining team of Ximing used the Jialike supports [Chinese pronunciation of a foreign name] in mining a 9-foot coal. Because the supports were not suitable, its average unit output stayed at 20,000 tons a month over a long period of time. In 1981, it changed to the use of the domestically produced ZY-35 supports and unit output has reached 60,000 to 74,000 tons a month. Other bureaus and mines also have had similar situations. What are the factors to be considered in support selection?

1. Structural Form of Support

Based on the conditions of coal in our country, the protective type or the support and protective type is a suitable support. They are suitable to both broken roofs and hard roofs. Under conditions of broken roofs, they are suitable because they have higher supporting strengths at the ends. In hard roof

conditions, the support and protective type also has more superior properties than a support type because it can stand greater horizontal thrusts. Regarding the computed data in this area, the author has already made a more detailed introduction in his article, "The Protective Type and Support and Protective Type Supports Should Be The Principal Forms of Support For The Development of Mechanized Mining in Our Country." Only the conclusions will be introduced here. The proofs will not be discussed. Based on the practices in 1981, the seven A ranking teams and the 13 mechanized mining teams with a production of over 500,000 tons during the year all used the protective type or the support and protective type supports.

2. Loading Capacity of Support

In selecting the proper resistance of a support, it should have a higher initial supporting strength. During the periodic pressure increases, the safety valve has a lower release rate. The Jiahe Mine of Xuzhou uses long beam-supporting protective supports. In 1981, the output was 622,000 tons. The initial supporting strength with good supporting results was 250 tons per support. The working resistance was 320 tons per support. Thus, the initial supporting strength was 78 percent of the working resistance. In actual use, the working resistance during the initial pressure increase was 163 tons per support. During a non-periodic pressure increase, it was 91.4 tons, or 53.6 percent of the value working under the initial supporting condition. It was 45.7 percent of the value working under a sudden increase of resistance. The safety valves did not release. The working resistance of the supports selected was too high. It was like pulling a small cart with a large horse and economically not rational enough. However, it can also be seen that the supporting results are better when the resistance is increased. The No 4 mechanized mining team of the No 1 mine of Yangquan produced 520,000 tons of coal during a 11-month period, mining a working face of 1.3-1.4 meter thick coal seam. It was using X-shaped support and protective type supports. The specified working resistance was 282.7 tons per support. The initial supporting strength was 215.4 tons per support, or 76 percent of the specified working resistance, and it was a high initial strength model. During a non-periodic pressure increase, the actual resistance was 193.5 tons per support. The working resistance during the periodic pressure increase was 223.8 tons per support. (Above values are time weighted averages.) During periodic pressure increases, the release rates for the back and front posts were 0.07 percent and 1.08 percent respectively. This type of supports is considered a low release rate model and the supporting results are better. Therefore, in the selection of resistance of supports, it should have a high initial supporting strength and the safety valve remains basically closed at the time of a non-periodic pressure increase and has a somewhat low release rate at the time of a periodic pressure increase. Such a selection for the resistance of supports is more rational.

3. Height of Support

The minimum height of a support should be 200 to 300 millimeter less than the minimum height of the coal seam. Its maximum height should be 200 to 300 millimeters greater than the maximum height of the coal seam. In the selection of the maximum and minimum heights of a support, consideration should be given not only to the current production conditions but also to the continuing working lives in the next few years.

4. Unit Pressure Against the Floor

This question is particularly important for soft floors and where a coal seam is mined by sublevels. The resistance of the floor rock or coal should be greater than the unit pressure [bi ya] the support exerts against the floor. The highest unit pressure of the support base should be determined as it is often many times greater than the average unit pressure. The mechanized mining team of the Yangzhuang Mine north of the Huai River [Huaibei] produced over 40,000 tons a month when mining the No 6 coal seam. Later, when it moved to mining the upper level of the No 5 coal seam, the supports dropped several tens of millimeters with each cut because of the softness of the coal. As a result, monthly output dropped to 20,000 tons and it was forced to dismantle the supports and select a different working face.

In addition to the types of support, the hardness of the coal is also a factor that should be paid attention to. It does not have a large effect on the support but it has a very large effect on the coal mining machine. Supports must meet the conditions of the working faces, but the suitable selection of a working face should also be made to meet the conditions of totally mechanized mining. Factors such as no large faults and no coal columns, small changes in the coal seam and small undulations, etc. also should not be neglected.

III. Good Engineering Quality

Good engineering quality covers eight principal factors. These are the commonly mentioned "three straight, two even, one clean, and two unblocked." The three straight refers to straight coal wall, straight liuzi [a haulage equipment moving coal from face to main haulage], and straight supports, which mutually affects each other. The two even refers to even floor and even roof. The one clean refers to relatively clean within the supports, with absence of debris and piles of waste rock and coal. The two unblocked refers to unblocked upper and lower exits [probably refer to the main and tail gates] and the two roadways. Among the eight factors, the first six requirements can be accomplished by the coal mining team itself. In addition to efforts by the coal mining team, the last two are also related to the mining sequence, quality of development work, and the shape of support in the roadways. Therefore, quality of engineering must be insisted upon.

First, when a new working face is handed over, it must be inspected according to standards. If it does not meet the standards, it should be dismantled and rebuilt. The No 4 mechanized mining team of the Yongdingzhuang Mine insists on a good working procedure, operating records, and proper work turn over and acceptance. As a result, 99 points were achieved for the engineering quality of the working face. The Pangzhuang totally mechanized mining team established a quality card system. The quality of engineering of a shift is inspected by the next shift. If it meets the standards, the incoming shift issues an up-to-standard card to the outgoing shift, which is recorded on the surface. Some teams have organized quality inspection groups consisting primarily of the team captains, deputy captains for machinery and power, and technical personnel. They insist on a system of weekly inspection, assessment every 10 days, and monthly evaluation and comparison. Some teams have established the positions of quality inspection personnel for three shifts who are directly under the

leader of the mechanized mining team. Their primary responsibility is the inspection of the engineering quality of the working faces. These are all effective methods to guarantee engineering quality, and they should be promoted. If the mining sequence is rational, work quality is good, and the selection of support materials for the roadway is proper, roadway deformation will be small and movements at the upper and lower exits and along the two roadways will be free of blockage. When the Qishan Mine of Xuzhou was mining the Xiaojiao Series coal seam in 1975, roadway deformation was very serious because of high pressure in the roadway and improper selection of the method of support which consisted of the building of ladder shaped canopies using 43 kilogram/meter steel rails. Two development teams had to maintain the roadway constantly during the year and the upper entry opening was difficult for workers to travel through. In 1980, a change was made to the use of arch shaped canopies built with 29 kilogram/meter U-shaped steel. The roadway had very little deformation and passage through the upper and lower exits and along the two roadways was free of blockage. The roadway of the mechanized working face of the Yangquan No 1 Mine used wooden canopies for support. The breakage rate was high. The mine has since experimented with the use of 29 kilogram/meter U-shaped steel and there is basically no deformation. Roadway deformation not only affects linkage with the working face but also affects production. Analysis of the 1.8-zhang [zhang equals 3-1/3 meters] coal working face of the Yangquan No 4 Mine has shown that roadway deformation was affecting the movement of the switching locomotives and 250 to 300 tons in coal output each small shift.

4. Good Equipment Quality

Soldiers must be well trained and arms must be good before battles can be won. Mechanized mining equipment must also be in good condition before high output can be achieved. To increase the operating rates of coal mining machines, the proper operation of all equipment must be guaranteed. Only in this manner can the breakdown time at the working face be reduced. Unspected events of machines and power are the leading causes for work stoppage at the working face. Based on the statistics of [] bureaus, including Yangquan, Xishan, Pingdingshan, Jixi, and Yima, the time affected by unexpected events at the working face is 39.96 hours per 10,000 tons of production. Of this total, time affected by unexpected accidents of machines and power is 19.1 hours per 10,000 tons of production. However, for the high production No 4 mechanized mining team of Yongdingzhuang, No 2 team of Yangquan No 2 Mine, No 1 team of Jiahe Mine in Xuzhou, and No 4 team of Pingdingshan No 1 Mine, the time affected by unexpected events of machines and power is only 3.82 hours per 10,000 tons of production as a result of good equipment conditions.

Good equipment quality mainly means that parts are complete and sound, screws are tight, supports do not leak liquid, coal mining machines do not leak oil, and equipment lubrication is properly maintained. The implementation of the "machinery contract system" and "four inspection system" is basic to the proper management of the mechanized mining machinery and equipment. The "machinery contract system" is to have individuals responsible for every piece of equipment, every pipeline, and every power cable at the working face. The No 1 mechanized mining team of Tongjialiang Mine practices machinery contracting by the guards [yuan is round and ban is shift; yuan ban probably main shift or

full shift] and responsibility on a sectional basis by the small shifts, using an individual responsibility system with signatures and cards. This is the concrete practice of the "machinery contract system." When an unexpected event occurs, the three not-let-go is practiced, not letting go without knowing the reason clearly, not letting go without knowing the responsibility clearly, and not letting go before the responsible person has learned his lesson. The "four inspection system" is the practice of compulsory maintenance on equipment. Four inspections refer to shift inspection, daily inspection, weekly inspection, and monthly inspection. The machine operators are responsible for the shift inspection during shift changes. The No 4 mechanized mining team of Yongdingzhuang insists on the use of the half hour before work starts in each shift for equipment inspection. The daily inspection is carried out by inspection and maintenance workers during the inspection and maintenance shift. The No 2 team of the Yangquan No 2 Mine assigns technically competent personnel to the inspection and maintenance shift to make sure that daily inspections are properly carried out. The weekly and monthly inspections are cooperatively conducted by inspection and maintenance workers of the mining team and from the Department of Machinery and Power. These inspections are aimed at the more major maintenance work and may be done during a small shift, two small shifts, or even longer time. In 1981, the first three of the A ranking teams all implemented the four inspection system, using one shift for inspection and maintenance and carried out with determination whatever work they encountered. Out of the 13 totally mechanized mining teams of the Kailuan Coal Mines, only the No 1 team of the Jinggezhuang Mine was able to persist with four-inspection and four-shift operations in 1981. Its average monthly output was 57,384 tons. All the other teams of the entire bureau could not carry out the four inspection system entirely because they were operating on a three-shift basis. Their average monthly output was only 33,000 tons. It can be seen from this experience that, despite any subject goal to produce coal, greater coal output may not be achieved if operating against objective rules. On the contrary, although scheduled inspection and maintenance appears on the surface to be a loss of time, greater coal production can actually be achieved.

The prevention of oil contamination, the maintenance of the hydraulic pressure systems of supports and prevention of liquid leakage, and the maintenance of proper equipment lubrication and prevention of oil leakage are important areas to guarantee the proper function of mechanized mining equipment. The Tangshan Mine of Kailuan uses special barrels to store oil, special tools for lubrications, and special personnel to add oil. It has effectively prevented oil contamination. The No 4 team of the Yangquan No 1 Mine has assigned special hydraulic pressure workers to specially handle oil leak and oil escape for the hydraulic pressure systems of supports. The No 2 team of the Yangquan No 2 Mine assigns special workers responsible for lubrication. They know very clearly the lubricating points and what and how much oil to use. As a result, unexpected equipment events due to oil lubrication have not occurred.

V. Persistent Maintenance of Regular Cycling

An operating method should be determined first. There are three operating methods among existing mechanized mining teams. One is the four-shift operation, three shifts for production and one shift for inspection and maintenance.

Under this system, time is fully utilized for production (production time is 16 hours a day) and time for inspection and maintenance is guaranteed. Using one shift for inspection and maintenance to guarantee three shifts of production, the time for inspection and maintenance is not squeezed out for production reasons and production is continuously and steadily developed. Another method is the three-shift operation system, two shifts for production and one shift for inspection and maintenance. Under this method, the time for production shifts is two hours less than the last method. And because the production shifts are eight hours, it is often difficult for workers to always make shift change at the working face. This is very unfavorable to the thorough implementation of the post responsibility system and the quality inspection and acceptance system. The third method is using two and one half shifts for production. The remaining one half shift for inspection and maintenance under this system is on the tight side. Moreover, it is often squeezed out for production reasons and actually affects production. Also, since one shift is mixed for production and for inspection and maintenance, the labor of some of the operators is not fully utilized when inspection and maintenance work is going on. Among the three operating methods, the one of three shift for production and one shift for inspection and maintenance is more suitable to the conditions in our country and should be vigorously promoted. Actually, this method is followed by our country's high production mechanized mining teams. Second, the number of cuts by the production shift must be determined. Based on the chain capacity, the travel speed of the coal mining machine should be determined. Then, based on the length of the working face, the time needed for one cut is established. After that, the number of cuts that should be made by each small shift is determined. [translator's note: in a couple of places, the term xiaoban (small shift) is used. It does not seem to have a different meaning.] Once the number of cuts is determined, it should be steadily maintained. If three shifts are used for production and the number of cuts produced by each shift is n, the total cuts for three shifts is 3n.

Let us now discuss what is the regular cycling of mechanized mining. Regular cycling was a concept adopted in the 1950's when explosives were used for mining. It stands parallel with the "old ox climbing the mountain" method. People now often have the habit of using this concept. Applied to mechanized mining, a regular cycling means the completion of the specified 3n cuts and specified daily inspection work. If only the number of cuts is completed and the inspection and maintenance work is not completed, it cannot be considered as regular cycling. In 1983, the No 1 mechanized team of the Pingdingshan No 10 Mine produced 780,000 tons with one set of equipment. The average monthly regular cycling rate was over 85 percent. In September, it reached 95.7 percent.

V). Implementation of Rational Distribution System

The establishment of a post responsibility system is only the first step. To properly carry out the post responsibility system, there must be an appropriate distribution system. Such a distribution system must reflect not only the quantity of labor but also the quality of labor. First, the sphere of responsibility of various types of work must be clearly determined and quality standards must be established, determining the advanced performance quota and

a system of awards and penalty. Judging by the distribution systems used by the high production mechanized teams, the system considered better is to use an advanced quota as the basis and the method of computing piece work for yuan-ban [literally, round shift], quantities for small shifts, points for individuals, and distribution according to points. In actual practice, the various systems of distribution and fulfillment, improvement of engineering quality and equipment quality, and guarantee of hardwork and guarantee of safety should be united. For example, the No 1 team of the Pingdingshan No 10 Mine started this system in May 1979. In the three years, it has revised the quota three times, from 10 tons/man-shift to 12 tons/man-shift and later to 16 tons/man-shift. Basic wages are assured only when monthly production is maintained at above 48,000 tons. For higher production, the mine pays wages for above quota piece work and financial awards are distributed to the small shifts according to coal output. The method of computing points for individuals is based on individual labor volume and technical quality. Base points are determined for each cut, such as 10 points for the operators of the mining machines and the support installation and maintenance workers at the upper and lower exits, 9 points for general support installation workers, and 8 points for haulage machine operators. The larger number of cuts are made, the higher the points are received. If quality is poor or if unexpected events occur, points are taken away from the persons responsible. The practice of this system overcomes the condition of "eating from the big pot" and negligence on quality and launches the positive action of the staff and workers. This method is basically adopted by our country's first three A ranked teams and other high production teams.

VII. Guarantee of Free Haulage Links

These are the outside conditions governing whether or not a working face can achieve high production. Some of the mechanized teams do not have high production. For many of these, it is created by the lack of appropriate facilities or capacities in the outside links. For example, some of mechanized teams have capacities of 600 to 700 tons/hour. However, they use Model 40 liuzi [see line 5, p 12 in the entry, as many as 8 to 9 units in some cases of draft], and their total capacity is only 150 tons per hour. Some use a 800 millimeter suspended conveyor belt with an hourly capacity of only 350 tons. In some cases, one 800 millimeter belt is jointly used by two mechanized mining faces. Some have very small coal storage capacity in the mining area, only 20 to 30 tons. Some mining areas have very small car loading station capacities. In some cases, one-ton mine cars are used in the main haulage way and the single rail haulage capacity is very small. In other cases, the hoisting capacity is very small, only 100 tons an hour. Under these conditions, it is very difficult or even impossible to achieve high production. On the other hand, some high production teams have very large capacities for these outside links. For instance, in the case of the No 4 team of the Yongdingzhuang Mine, the distance from the working face to the surface is 5,500 meters. It is entirely belt haulage, the mining area has a 530-ton coal bunker, and the cushioning storage capacity at the working face is as high as 1,500 tons. The No 1 team of the Tongjialiang Mine uses 3-ton bottom drop mine cars, while the high production teams of Yangquan and Xishan have practically no large coal storage facilities and do not use 3-ton bottom drop mine cars for haulage.

(iii). Proper Development of Geological Report, Guarantee of Working Face Continuity, and Reduction of Production Stoppage Time as Much as Possible

In order to prepare good battle grounds for the mechanized mining teams, the Dongjialiang Mine follows the principle of "looking at three years" to make sure of the continuity of working faces. The design of working faces should meet the characteristics of the mechanized mining teams as much as possible. The working faces should be longer if feasible. Lengths of 150 to 180 meters are suitable. If conditions permit, zigzag [wangfu] mining should be adopted. For instance, the No 2 team of the Yangquan No 2 Mine mines along the dip in sections where the angle of dip is small. The design phase of mechanized mining should be properly carried out. In preparing for the next working face, manpower, materials, advance, and measures should be properly resolved. The work quality during development should be strictly followed to avoid future production difficulties. At the same time, the geological structure of the next working face should be explored and information on roof rocks and their conditions and faults should be provided to the mechanized mining team before it moves. The Guandi Mine prepares the next working face for a high production team two months in advance.

It also uses a fault investigation instrument for exploration and if problems are found, preparations to deal with them are made in advance. At times of moving, production stoppage time should be reduced as much as possible. In this area, two types of situations have been found. Some mechanized mining teams do not have any reserve equipment, such as the No 1 team of the Pingdingshan No 10 Mine and the No 2 team of the Yangquan No 2 Mine. Others do have reserve equipment, such as the No 4 team of Yongdingzhuang and the No 3 team of Guandi.

The No 1 team of the Pingdingshan No 10 Mine uses light weight supports, which are only 3.6 tons each support. In 1980, the team moved twice and the year's output was 750,000 tons. The first move had two extra shifts added and took six days. The second move took seven days. During the months that the team made the moves, it still was able to produce 48,060 and 48,700 tons of coal respectively. During the moves, a temporary command post was established, headed by the responsible person for the mine, and a coordination office was established under it. Because of the tight organization, clear definition of responsibilities, and proper work coordination, a smooth process of equipment dismantling, loading, haulage, and installation was assured. The No 2 team of the Yangquan No 2 Mine uses heavy weight protective supports, but it also has adopted methods for rapid moving. The yearly output from one set of equipment was 630,000 tons.

For those mechanized teams with reserve equipment, they can install and test the equipment at a new site before mining is completed at a working face. In this manner, they can move to the new working face for immediate coal production as soon as mining is completed at the old working face.

(iv). Multiple Logistics Base for Inspection and Repairs

For the ease of being able to make moves rapidly, mines that have many sets of equipment should establish specialized moving teams. To assure that the

equipment is in good condition, they should have appropriate specialized inspection and repair forces to engage in minor repairs of equipment and to assist the mechanized mining teams in their weekly and monthly inspections. In order that defective parts may be replaced immediately, the bureaus and mines should have centralized and well supplied stock rooms of spare parts for mechanized mining equipment. In order that equipment is well lubricated, they should have special containers and oil storages for industrial hydraulic gear oils, turbine oil, friction resistant hydraulic liquids, lubricants, and emulsified oils. After a piece of equipment has been used for a definite period, it should be moved to the surface for inspection and repair. The mining bureau should have a strong inspection and repair base that will carry out repairs and overhauls according to schedule and quality requirements.

Our country has not used mechanized mining equipment long. Compared to the world's advanced coal mining countries, our totally mechanized coal mining teams are still a young army. We should learn with humility the advanced experiences abroad. At the same time, we should also pay important attention to our own experiences. This will allow the mechanized mining equipment to demonstrate even greater results and capabilities and to provide even greater energy resources for the "four modernizations" construction.

5974
CSO: 4013/70

COAL GASIFICATION, LIQUEFACTION CONFERENCE HELD IN KUNMING

Kunming YUNNAN RIBAO in Chinese 11 Apr 82 p 2

[Article by Xiong Zhongshu [3574 0112 3219]: "Hasten the Pace of Developing Coal Gas in Large and Medium Cities and Mining Regions; the Third National Conference of Professional Coal Gasification and Liquefaction Groups Is Held in Kunming"]

[Text] The Third National Conference of Professional Coal Gasification and Liquefaction Groups held recently in Kunming studied preliminary plans for developing coal gas in large and medium cities and cities in mining regions and revised the "sixth five-year" scientific research plan.

After participating comrades heard the plans for developing urban coal gasification in large and medium cities and cities in mining regions as well as the general reports on preparations to build coal gasification plants in five cities including Beijing and Shanghai, they felt more profoundly that developing urban coal gasification is a major task that should not be delayed. The level of coal gasification in our nation's cities is very low. Among the more than 200 cities, only more than 70 have coal gas facilities. By population, among the urban population of over 88 million, only more than 16 million people use coal gas (including artificial coal gas, liquefied petroleum gas and natural gas), constituting only 18.1 percent (artificial coal gas constitutes 7 percent). Yet, the popularity of coal gas in Western European nations, the United States and Japan is over 85 percent. At present, the main industrial and civilian fuel in our nation's cities is coal. The thermal efficiency is low and the environment is polluted. Urban development is gradually developing towards suburbs. Burning coal has brought about many inconveniences to the masses. The request by urban residents and concerned departments to use coal gas is becoming more vociferous. The conference believed that we must conscientiously implement the spirit of the directives of the Central Committee of the Party, suit measures to local circumstances, start out from the actual situation, use many ways to hasten the development of mainly using coal to produce gas as urban coal gas, change the structure of urban fuel, and promote modernization of urban construction.

The conference believed that using coal as the raw material to produce coal gas is an important way to develop urban coal gas. Each locality should suit measures to local circumstances, suit coal to local circumstances according to the coal resources of the locality and the supply and marketing of coal and

combine the far and the near and seriously select appropriate technology for producing gas. Viewing future development, we see that besides fully utilizing presently available coking furnace coal gas, we can also selectively build a few coking furnaces at localities where the conditions and the resources are suitable. At present, the progress of scientific research in coal gasification in our nation is still very slow. It is suggested that coal gasification and liquefaction be included as projects to be studied by the state. At the same time, we should develop the production of methane as liquid fuel to suit the needs of developing sources of energy.

The conference held a panel discussion on the problem of coal gasification in Shuning City and proposed beneficial suggestions. The conference also organized visits to related chemical fertilizer plants and conducted panel discussions on technical problems.

Among those attending the conference were members of the professional group of the State Science and Technology Commission; delegates and specialists from related agencies, business enterprises and units and higher educational institutions totalling more than 100 people.

9296
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MORE EFFICIENT USE OF COAL FIELD ASSOCIATED GAS URGED

Beijing NENG YUAN [JOURNAL OF ENERGY] in Chinese No 2, 25 Apr 82 pp 21-22

[Article by Wang Kehuan [3769 0668 1403], Li Zhi [2621 1807], and Sun Qigui [1327 0796 6311]: "Exploitation and Use of Coal Field Gas"]

[Text] Gas is adsorbed or accumulated in the rocks that surround coal seams when the coal seam is tightly compressed by a rock overburden to form a combustible gas body in association with coal. It is characteristically colorless, tasteless, odorless, and of light specific gravity (0.716 kilograms/meters^3 under standard conditions). When mixed with air, it has a concentration of from 5 to 15 percent, is highly explosive, and has a heat value of 8,500 - 9,000 kilocalories/meters^3.

Someone in a foreign country has prognisticated that under usual conditions, were the rock surrounding a coal seam to be impervious, for every ton of coal formed between 600 to 700 cubic meters of gas would be formed. Of course, because of the porosity of the overburden, a very large part of the gas formed in association with coal is released into the surrounding rock strata. Even so, reserves are sizeable. In the Donbass coal fields of the USSR, below a depth of 1,800 meters gas reserves amount to 100 billion cubic meters, the equivalent of 2 billion tons of top quality coal. In the United States, the pure gas content of a mineable coal seam is 2.124 billion cubic meters.

Not only are gas reserves abundant, but gas is easy to use and its thermal efficiency is high. The coal briquets that people commonly use have a thermal efficiency of approximately 15 to 25 percent, while that of gas is more than 75 percent. When nearby cities or industries use it, transportation, storage, and management are all very convenient.

Pumping of gas is a technique for increasing energy and saving on mine shaft electricity consumption, and is also a safe method for developing coal fields. This does not require increases in large amounts of expenditures for projects and equipment in order to solve the energy needs of nearby urban residents, boilers, and small power generating plants. Today the major coal producing nations of the world are giving serious attention, one after another, to this problem, gradually turning toward active pumping, to doing overall planning, and to rational exploitation.

1. Current Situation Regarding Gas Exploitation and Use by World's Major Coal Producing Nations

1. Gas Exploitation

At the present time there are slightly more than 440 mine shafts in the world from which gas is pumped at the same time coal is being mined, the volume pumped being 3.125 billion cubic meters. The gas pumping rate for the mining areas is 80 to 85 percent, and the mine shaft pumping rate amounts to 40 to 70 percent. In Poland, West Germany, and the United Kingdom, the mine shaft pumping rate is 70 percent.

In 1976, Japan's output of coal was 18,444,000 tons and gas pumping was done from 11 mine shafts. Volume increased from less than 100 million cubic meters per year in 1955 to 320 million cubic meters per year in 1976. This shows that energy short Japan attached serious importance to mine shaft gas in its exploitation policies, and that there was new developments in its pumping techniques as well. In the 25 year period between 1950 and 1975, quantity of mine shaft gas pumped in the United Kingdom rose 125 times. During the same period, volume of coal output declined 41.5 percent. The United States does fairly little pumping of mine shaft gas, but it uses new techniques capable of increasing the pumping efficiency rate such as magnetically controlled directional drilling. West Germany pumped gas for the first time in 1942, but has now formulated a set of mine shaft gas pumping standards and volume of gas exploitation increases year by year, and coal output has also remarkably increased as a result of forepumping of the gas working area. Volume of gas pumped amounts to 50 percent of the quantity emitted by the mine shaft. Between 1955 and 1975 the USSR's gas output increased by 32 percent, the volume of gas pumped increasing 19.38 fold. They accumulated definite experience between 1948 when they started to pump gas until 1957, and the USSR pumps more gas per year than any other country in the world.

2. Several Ways of Using Gas

All the countries of the world today widely use gas as a fuel and as a raw material for the chemical industry. Several representative applications with prospects are briefly described below.

(1) Gas generation of electricity. The ratio of mine shaft gas used to generate electricity is steadily rising in Japan where it accounted for 43.8 percent of the total volume pumped in 1974, 52.3 percent in 1975, and 58.2 percent in 1976. There are two ways of using it. One way is to burn gas directly to generate electricity. Another way is to use a mixture of gas and powdered coal to generate electricity. In February 1978, a mine shaft in Northern Wales in the United Kingdom began to use a gas turbine to power a 1,600 kilovolt-ampere generator to generate electricity. The machine required gas at a rate of 28 cubic meters per second, and its generating capacity could supply 30 percent of total electricity consumption in the mine shaft. Waste gas from the gas generator could heat boilers needed for 650 people to take a bath, to heat offices in the winter season, and to keep the mineshaft warm in winter. When the gas concentration pumped from the shaft was lower than needs, the turbine used diesel oil as a fuel. They believed that gas in concentrations above

50 percent produced good results in generating electricity. The United States is getting ready to use pure gas and gas in low concentrations as a fuel for turbines, and to use pipe lines to carry gas to atomic energy electric power generating stations involved in experiments. The USSR is also studying use of mixed gas to generate electricity. Success will permit a 25 to 30 percent saving of solid fuel for an annual saving of 1.5 million rubles.

(2) Boiler fuel and urban coal gas. The burning of mine shaft gas with other fuels in order to guarantee a consistent supply and even burning is yet another new trend in foreign use of gas. Japan, for example, mixed mine shaft gas and gasoline to make a gas with a heat generating capacity of 5,000 kilocalories, which was used in 1976 in a proportion of 1:1. The United Kingdom mixed gas and coal, particularly low grade coal for use in firing smelting plant furnaces. After being compressed, it can also be used as a fuel for internal combustion engines and automobiles. In the United States, liquified gas was provided for boilers and turbines generating electricity. In the USSR, gas of low concentration (12.5 percent) was blown into furnaces to help coal burn for a 25 to 30 percent saving in solid fuel. Czechoslovakia also burned gas and solid fuel in a 1:1 ratio, low grade coal or waste rock being used as the solid fuel.

A technology in general use today that is simple and workable is pipeline transportation of fuels used by the people or industry. Czechoslovakia is foremost in this field. They link together gas sources in a mining area for both handiness in adjusting and controlling them and for assuring consistent quality in the area to which they are supplied.

(3) Present Situation and Outlook for Exploitation and Use of China's Coal Field Gas

1. Coal Field Gas Reserves and Prospects. No general survey has been done and no statistical data are available presently on gas reserves. On the basis of mine shafts developed, reserves are fairly abundant. According to computations made from gas mine shaft appraisal data and actual coal output in 1979, annual gas release at major and uniformly equipped coal mines as determined by the release of gas from air circulated for ventilation was as much as somewhat more than 3.6 billion cubic meters, or the equivalent of the total amount of annual coal gas output of 10 urban coal gas plants with a daily output of 1 million cubic meters. Taking only statistics from the 124 mine shafts in China where varying degrees of gas pumping is being done, within the scope of the present design depth (generally less than 750 meters), gas reserves available for exploitation amount to 104 billion cubic meters, from which the quantity of coal following burning is equal to 500 million tons of coal. At a depth of 1,000 meters, estimated reserves may be greater than 150 billion cubic meters.

(1) reserves in the Yangquan Mining Bureau in Shanxi Province are 8,658,600,000 cubic meters. Even if the pumping rate is only 23 to 25 percent, more than 2 billion cubic meters of gas can be exploited. If 50 million cubic meters is pumped annually over a 40 year extraction period, the energy will amount to almost the amount of electricity that the bureau uses annually. Though the Fuchuan Mine in the Fushun Mining Bureau has stopped production and has been abandoned, its possible surplus gas amounts to more than 2.7 billion cubic meters. In addition, gas is released by coal seams of the Tangshan mine currently leaving 1,000 to 1,200 cubic meters.

In short, accompanying development of the coal industry has been a gradual increase in exploitable and useable mine shaft gas, and this is an energy source requiring little expense for exploitation, that can be readily used, and that has rather good prospects.

2. Current Status of Exploitation of China's Coal Field Gas. Among uniformly equipped and key coal mines, more than 40 percent of the total number of mine shafts are high gas mine shafts. Pumping is still being done at 101 of the existing 124 pump mine shafts, and 23 mine shafts are now being equipped or waiting to be equipped with gas pumping systems. The 101 mine shafts have an annual pumping output of 1.553 billion cubic meters, a mine shaft pump rate averaging 78 percent. It may be seen that the mine shaft pumping rate can be further increased.

Because the gas pumping currently being done in China is primarily for safety in mine shaft production, consequently all arrangements and management are primarily for coal production. The gas is also mostly produced by the mine, managed by the mine and used by the mine. Pumping techniques and equipment are about what they are in foreign countries. However, active arrangements for pumping have yet to be made from the standpoint of gas being an energy source; consequently pumping efficiency is very low.

3. China's Mine Shaft Gas Utilization. A look at utilization rate figures shows 70 percent for 1979 and 78.9 percent for 1980. However, in actual fact, because of poor management and limitations in equipment and instruments, waste and loss has been fairly great. Since 1957, the Yangquan Mining Bureau has pumped a total of 795 million cubic meters of gas, and in 1979 it pumped 68.85 million meters or 131 cubic meters per minute. Of the total, 45.8 percent was used as raw material for the chemical industry, 300 tons to make carbon inks, and 300 tons to make formaldehyde. The remainder was use as fuel by the citizenry, supplies going to 7,761 households, 22 messhalls, 31 tea urns, and four small boilers. However, each household daily consumed between 40 - 50 cubic meters, which was 20 times the amount of coal gas used by the residents of Beijing. Another example is the Fushun mining district, where coal gas is used rather well but where waste is extremely shocking nevertheless. At the present time, it pumps about 100 million cubic meters annually, the equivalent of 269 million cubic meters of urban coal gas. With proper management, this could supply entirely the needs of Fushun's 225,000 residents. However, in addition to the 6.32 million cubic meters currently used by industry, only 70,000 residences are supplied.

In China, gas is used largely as fuel by the people, to fire boilers, to make formaldehyde, and to make carbon ink. It has not yet developed toward being burned in combination with solid fuels and for the generation of electricity. The scope of its utilization is rather narrow; the system is not very well developed, and in management and coordination some areas awaiting improvement exist.

4. Outlook. Since exploitation of coal as a foremost energy source is being carried out, prospects are very good for the exploitation of mine shaft gas that is produced in association with coal. All that is needed is sensible

arrangements for pumping and strengthening of management, even with no increase in new pumping from mine shafts, within 5 years the volume of gas exploited can increase to about 500 cubic meters per year.

Mine shaft gas is a top quality energy source with an extraction life that is longer than coal's. It is characterized by a simple technology for exploitation, little investment of funds, quick results, suitability for use nearby, and it can generate electricity at the pit head or be mixed with low grades of solid fuels for burning. If only we will actively exploit it for use, the important position of gas as an energy resource will become apparent very quickly.

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BRIEFS

QINGHAI SEMIANNUAL COAL PRODUCTION--By 6 June the Qinghai provincial coal bureau had fulfilled its semi-annual raw coal production plan by producing 648,000 tons. Compared with 1981, the ash content and cost of coal declined. [Xining Qinghai Provincial Service in Mandarin 2330 GMT 17 Jun 82 SK]

HEILONGJIANG COAL PRODUCTION--Harbin, 15 Jun (XINHUA)--After 3 years of consolidation work and technical reform, Heilongjiang's coal mines, whose products are under the state's unified distribution, increased their output by 4.3 million tons from 29 million tons in 1978 to 33.3 million tons in 1981. The output during the first 4 months of this year increased by 1 million tons over the corresponding period in 1981. The total amount of workable reserves of coal in the province increased from some 110 million tons in the past to some 150 million tons, sufficient for coal extraction work for 5 years. The amount of coal put in reserves increased from some 51 million tons to 63 million tons while the amount of recovered coal increased from some 22 million tons to some 26 million tons. [Beijing XINHUA Domestic Service in Chinese 0232 GMT 15 Jun 82 DW]

URUMQI COAL PRODUCTION--By 24 June, the Urumqi mining bureau had extracted 888,000 tons of coal and fulfilled its quota for coal extraction for the first half of this year ahead of schedule. Its output was some 100,000 tons more than in the corresponding period of last year. [Urumqi Xinjiang Regional Service in Mandarin 1300 GMT 25 Jun 82 HK]

CSO: 4013/111

LIAONING FULFILLING COAL PRODUCTION PLAN--As of 26 June, collieries whose products are distributed under the unified state plan had turned out 14.6 million tons of raw coal, an increase of 11 percent over that of the corresponding [as] period and fulfilling the semiannual target 4 days ahead of time. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 26 Jun 82 SK]

JILIN RAW COAL OUTPUT--Collieries throughout Jilin Province whose products are distributed under the state's unified plan prefulfilled and overfulfilled their semiannual production plan by 6 days and by 21,000 tons, prefulfilling their semiannual coal dressing and exploratory footage plans by 21 days. [Changchun Jilin Provincial Service in Mandarin 1100 GMT 26 Jun 82 SK]

GANSU RAW COAL OUTPUT--Gansu provincial coal mining enterprises prefulfilled the semi-annual raw coal production and tunnelling footage plans by 10 days and 1 month respectively, overproducing 153,000 tons of raw coal as of 22 June, an increase of 23.4 percent over the corresponding 1982 period. The tunneling footage also showed an increase of 31.4 percent over the corresponding 1982 period. [Lanzhou Gansu Provincial Service in Mandarin 1125 GMT 24 Jun 82 SK]

GUANGDONG COAL PRODUCTION--The coal mines in Guangdong Province fulfilled their quotas for raw coal production for the first half of this year 11 days ahead of schedule. By 27 June, the province had produced some 3,330 million tons of raw coal, which was 320,000 tons, 10 percent, more than in the corresponding period of last year. The economic returns and the situation of production safety of the coal mines are better than previous years. These coal mines have initially turned losses to profits. According to statistics, some 300 coal extraction teams and tunnelling teams of the provincial subordinate coal mines have universally implemented the economic responsibility system while universally implemented the economic responsibility system while prefectural and county coal mines have also implemented this system on a trial basis. [Guangzhou Guangdong Provincial Service in Mandarin 1000 GMT 29 Jun 82 HK]

CSO: 4013/114

TRANSFER TO EAST CHINA OF SOME PETROLEUM PROCESSING URGED

Beijing NENG YUAN [JOURNAL OF ENERGY] in Chinese No 2, 25 Apr 82 pp 5-7

[Article by Cheng Guangquan [4453 0342 6112] and Wang Zhuming [3769 4376 2494]; Anqing Petrochemical Works: "Equitable Regional Distribution in the Readjustment of Petroleum Processing"]

[Text] Petroleum is an important resource about which people are extremely concerned and for which the conflict between supply and demand is currently pronounced. In order to equitably use petroleum resources, in addition to taking action to effectively reduce burning and conserve use of oil, the readjustment of petroleum processing areas is also a major method that should not be overlooked.

As of now, China has built and put into production more than 50 large and medium size petroleum refineries and petrochemical enterprises. The mix is rather complete, and includes petroleum refining and production units that use petroleum as the raw material for making other raw materials for chemical fibers, plastics, rubber, chemical fertilizer, organic chemicals, and detergents. They are located, for the most party, in the northeast, in North China, and along the banks of the Chang Jiang (called the region along the river for short)*. These petrochemical enterprises were built and went into production at various times and gradually developed. The kinds of production, component plants, and technological equipment vary too. Differences are fairly great in the economic structure of the areas in which they are located, and as a result the technical and economic results derived from the processing of petroleum in different places and enterprises also vary greatly. Right now the major existing problem is inequitability in regional distribution of quantities of petroleum processed, an overly large amount being processed in the northeast, which accounts for about 40 percent of the national total, and an overly small amount being processed in the region along the river, which accounts for about 30 percent. This is less than the quantity of petroleum processed in Liaoning Province alone. The regional overconcentration of petroleum processing has impaired equitable use of petroleum resources and added to the railroads' transportation burdens. In order to change this inequitable situation, the northeast's increased processing of petroleum from the region along the river should

*By the "region along the river" is meant Zhejiang, Jiangsu, Anhui, Jiangxi, Hunan, and Hubei provinces, and Shanghai.

...now be reduced so that the nine oil refineries, the six large chemical fertilizer plants, and a group of petrochemical fiber plants in the region along the river can play a greater role and win greater economic results.

4. Equitable Use of Double Processing Equipment To Increase Extent of Processing

1. Increase in output of light oil products means increase in national income. Catalytic cracking equipment is currently China's principal processing equipment for the production of light oil products, and full use of this equipment is a major way to increase output of light oil products. The eight catalytic cracking facilities in the area along the river have a gross production capacity of about 8 million tons, almost double that of the northeast region. Because of a current lack of raw materials, the equipment's potential has not been put to full use. Moreover, because of the overly large quantities of petroleum processed in the northeastern region, and the overproduction of cracked raw oil, which catalytic cracking facilities are "unable to digest," the technologically backward thermal cracking facilities must carry on high load production. This impairs product quality and the acquisition rate for light oil products so that the cracked raw materials cannot be equitably used. If the quantity of petroleum processed by the northeastern region were to be reduced, and five thermal cracking facilities shut down, extrapolation from the 2.7 million tons of raw materials processed in 1980 shows that after a change to processing by the catalytic cracking facilities in the region along the river, the annual increase in output of gas and diesel oil would be 400,000 tons, and national income would increase by more than 100 million yuan.

2. Increased output of aromatic hydrocarbons for a saving in foreign exchange. At the present time, the northeastern region has only three catalytic reforming facilities of identical types for the production of aromatic hydrocarbons, and the region along the river has five. Production capacity of the region along the river is greater than that of the northeast. Were the volume of petroleum processed by the region along the river increased, and the supply of reformed raw materials sufficient, this region could annually produce almost 30,000 tons more of petrobenzene and 30,000 tons of polyester raw materials than the northeastern region produces for a saving of $30 million in foreign exchange. Following improvements, production capacity of the six facilities could increase by from 30 to 50 percent, and output of aromatic hydrocarbons could also increase.

In 1980 China imported 40,000 tons of 66 monomers of caprolactam and nylon, and 120,000 tons of polystyrene. Were the region along the river able to greatly increase its benzene output, it would be able to develop conditions to supply plastic and fibers needed in markets and would also be able to save foreign exchange.

5. Improvement in Overall Extent of Use of Petroleum and Increased Output of Chemical Products

Through directly distilled light oil output from the northeastern region is currently great, it is not fully used. Meanwhile, with the burgeoning of chemical industries in the region along the river, all sorts of conditions exist for the

equitable use of directly distilled light oil. Following readjustment of petroleum processing areas, the increased output of light oil would be able to increase output of various chemical industry products.

1. Increased output of urea to reduce imports. The two imported large chemical fertilizer facilities use oilfield gas as their raw material and as their fuel, so increase or decrease in the quantity of petroleum processed would not impair urea production. The six facilities (including one in Zhejiang currently under construction) in the region along the river use petroleum as raw material and as fuel, so increase or decrease in quantity of petroleum processed would directly impair the quantity of urea produced. In 1980, the quantity of petroleum processed was insufficient, so imported facilities at Nanjing, Anqing, Jiujiang, and Wujiang cut back production of urea by about 650,000 tons. Today the situation is one in which, on the one hand, the equipment capacity of the large chemical fertilizer facilities in the region along the river is not being used to the full, while at the same time large quantities of urea are being imported. In 1980, 1.85 million tons of urea were imported from [illegible] one at a cost in foreign exchange of $370 million. The six provinces in region along the river are China's major agricultural area where production of urea approaches consumption. Reduction of imports and quantities moved in from outside the region would save on transportation and transportation expenses.

In addition, the region along the river has oil refining and chemical industry facilities, which are capable of using directly distilled light oils rationally. If some of the directly distilled light oils could first undergo processing in catalytic reforming equipment to produce aromatic hydrocarbons, the leftover topped oil and chouyu [2132 7411] oil being supplied to chemical fertilizer plants for further use, the double use of a single raw material could produce both aromatic hydrocarbons and urea.

2. Increased cracking of raw materials to develop the petrochemical industry. Because the quantity of oil currently processed in the region along the river is small and supply of raw materials for cracking insufficient, petrochemical industry production has been impaired. An example is the important organic raw material for epoxy ethane. Because the Gaoqiao Chemical Industry Plant in Shanghai lacked several tens of thousand tons of cracked raw materials, it had no choice but to shut down its epoxy ethane manufacturing equipment. Meanwhile the nearby Shanghai No 3 Detergent Factory was still renovating its epoxy ethane facilities, investing funds in construction for diversification. It switched to the use of grain alcohol as a raw material and consumed large quantities of chlorine gas, incurring high costs and seriously polluting the environment as well.

Once the quantity of petroleum processing in the region along the river has been increased and more cracked raw materials become available, the large Jinshan, Gaojiao, and Yuexing chemical industry enterprises will be able to increase their output of chemical fibers, rubber, and organic raw materials, materials which are in short supply. Of more importance is that some large imported petrochemical and chemical fiber plants under construction or planned for construction in the region along the river will have a supply of raw materials, and large-scale increases in production of light and textile industry products will become possible. This will also open broad vistas for the region along the river's use of heavy oil in its chemical industry.

chemical industry use of refinery gases. Development of the petrochemical industry and the introduction of large size cracking equipment to produce chemical industry raw materials is certainly necessary; however, refinery gases used by the chemical industry are also a major resource that should not be overlooked. Four of the eight catalytic crackers in the region along the river are large 1.2 million ton ones, which annually produce 1 million tons of gas. This is more than the total gas amount 300,000 ton ethylene installation. Were 15 percent of this chemical industry, the amount would be fairly impressive. Refinery facilities, which are capable of producing C_3 olefin and C_4 olefin, are not now fully used for lack of raw materials, and products made from C_3 olefin and C_4 olefin continue to be imported. In 1980, the Ministry of Light Industry imported more than 10,000 tons of polypropelene, and the Ministry of Textiles planned to import 40,000 tons of acrylonitrile at a cost in foreign exchange of more than $100 million. There is also a shortage of butadiene, the raw material for dinger [illegible] rubber and butadiene rubber. Were the region along the river's petroleum processing capacity to be increased so that supply of cracked raw materials was ample, the large quantities of C_3 and C_4 olefins produced as a by-product in the catalytic crackers could be supplied for the use of the petrochemical industry, and acrylonitrile would not have to be imported, the shortage of butadiene would be solved, and foreign exchange would be saved. Furthermore, C_3 and C_4 olefins can produce high octane gasoline ingredients.

3. Rational Product Flow and Improvement in Railroad Transportation

The finished oil products currently produced in the northeastern region account for 40 percent of the country's total, but that region can consume only one-third of them. The remaining two-thirds have to be moved into China Proper and transported to all places. Of most importance is that the finished oil products produced by plants in Liaoning Province are shipped over the Shenyang-Beijing line. But since oil refining capacity is large in North China and East China, the potential for transportation of finished oil products into these areas is enormous. As a result, finished oil products produced in the northeast have to be hauled by train over long distances, traversing North China and East China on their way to the southwestern region.

Once attempts to be made in the northeastern region's petroleum processing facilities, the region's production of finished oil products being substantially increased within the region (special oil products excepted), the transportation situation would rise a great turn for the better.

Also, finished oil products of different kinds and crude oil both have to be transported into China Proper causing transportation congestion. Following the establishment of petroleum processing regions, the situation would be changed. Only a single variety of crude oil would be transported into China Proper, and it would be so via the Tianjin and Tieda oil pipelines, and then via coastal transportation to the industrial plants in the region along the river. Taking into consideration of the oil pipelines and water transportation,

[illegible] as a result of recent years of an increasing shortage of coal in the [illegible] region, plus the need to reduce the burning of oil year by year, the quantity of coal shipped from within China Proper has steadily increased, amounting to more than 10 million tons in 1979. Moreover, the newly completed Beijing-Tanshan line has a capacity of only somewhat more than 10 million tons and capacity of its branch lines is small, so the major traffic artery between China Proper and the northeast remains the old Beijing-Shenyang line the capacity of which is already saturated. Following readjustment of petroleum processing regions, transportation into China proper of finished oil products can be reduced by about 9 million tons, greatly relieving the burden on the Beijing-Shenyang line and providing conditions for increase in the quantity of coal shipped out of China Proper. This would have major significance for the northeast system's conservation of electricity and steel, and for reduction in the burning of oil. It would also permit savings in investment for construction of railway lines concerned.

Third, [illegible] of the chemical fibers, chemical fertilizers, chemical raw materials and finished petroleum products produced in the region along the river are sold near the area of their production, making for a sensible direction of flow of goods. Finished oil products from outside the region are distributed by a combination of water and land transportation, which is very convenient. Operation of the Gezhou Dam and the opening to vehicular traffic of the Jiliu line have created excellent transportation conditions for the movement of finished oil products into Sichuan and the southwest. As compared with the former transportation from the northeastern region, large quantities of energy would be saved, and a saving of almost 100 million yuan in transportation expenses would also be realized. Transportation to nearby points would also mean a reduction in turnover time and quantities maintained in inventory for commercial units, a reduction in transportation links, and a saving of administration and management expenses. Movement back and forth of railroad unit tank cars could also be greatly decreased. This would mean a saving in investment for the construction of tank cars and related auxiliary facilities, and would lower railroad transportation and administrative expenses.

Readjustment of the quantity of petroleum processed is a major overall issue that has ramifications for the location of oil refining and petrochemical industries. It most certainly is not something that can be done as soon as one says it is to be done. The present set-up has come into being over a period of many years, and future readjustments and changes will also have to be done [illegible] and need a period of time. While assuring the northeast region's [illegible] for oil for chemical fibers, the chemical industry, for aromatic hydrocarbons, and for lubricating oils, the main conception is for use of current processing amounts as a base figure that is reduced gradually, first by 10 percent and finally by 40 percent to attain a situation in which the amount of petroleum processed is set at the quantity of consumption of finished oil products within the region. Once output has been set on the basis of sales, the quantity of petroleum processed may be annually reduced by an average of somewhat more than 10 million tons, which can be allocated to plants in the region along the river. Such a reduction should be carried out in coordination with [illegible] reductions in the burning of oil. So as not to [illegible] production [illegible] also have [illegible] as a result of [illegible] in production of some heavy

[illegible] the course of current small reductions in the quantity of petroleum [illegible], four sinking facilities can be shut down, the heavy oil saved thereby [illegible] offset the setbacks.

[illegible] of an economic petroleum processing area is a major ingredient in [illegible] policies requiring regular thoroughgoing study and examination. Right [illegible]. Most important is readjustment of the quantity of petroleum processed in the northeast and in the region along the river. This will play a role in [illegible] amelioration of energy and transportation shortages, and is of major [illegible] also for development of the national economy and the economy of the regions along the river.

Rational readjustment of the quantity of petroleum processed is, in fact, the regional distribution and overall use of petroleum energy and petroleum's chemical raw materials. It creates conditions for improvement in transportation facilities and transportation methods, thereby achieving a saving in energy, improvement in management, and promotion of economic development. Naturally, rational readjustment of the quantity of petroleum processed must be carried out simultaneous with the readjustment of each enterprise in a region and with readjustment of production categories if it is to yield expected results. The problem of current shortage of petroleum is becoming increasingly urgent and [illegible] in the provinces, municipalities, and enterprises concerned as well as [illegible] commerce, communications, railroads, petroleum, the chemical industry, textiles, agriculture, coal, and the light industry sector. Consequently widespread discussion is necessary to hear all points of view and to formulate genuinely workable measures. This is the only way in which China's present 100 million tons of petroleum can play a greater role and give impetus to more rapid development of the national economy.

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OIL PROSPECTING IN EASTERN TARIM BASIN OUTLINED

Jiangling SHIYOU YU TIANRANQI DIZHI [OIL AND GAS GEOLOGY] in Chinese Vol 3, No 1, Mar 82 p 40

[Article by Kang Yugui [1660 3768 2710]: "New Find at Yuecan-1 Well in Tarim Basin"]

[Text] In September 1981 drilling was completed to a depth of 4747.18 meters at Yuecan-1 well in the northern part of Yuejin No 1 Zhongligao in Shaya County located in the East Tarim depression zone of the Tarim Basin. This is presently the sole deep well in the vast East Tarim depression area. It is of major significance for understanding the region's geological structure and development of deposits since the Cenozoic and Mesozoic eras, and for its petroleum and gas prospects.

In the course of drilling the Tertiary system (N) to a depth of 3564.5 meter (drilled thickness, and likewise in subsequent text), yellowish-gray, brownish-yellow, light brown, and grayish white fine siltstone rock, siltic mudstone, metamorphic rock containing marine facies kongchong [1313 5849] and jiexingchong [1048 1748 5849] were found that were substantially comparable to those of the Kuche depression Tertiary system.

Below the Tertiary system at a depth of 477 meters was brownish red and brown mudstone, argillaceous siltstone, silty mudstone, and grayish white siltstone underlayed with fine conglomerate sandwiched into pelitic siltstone, with weathered minerals such as kaolinite, glimmerton, and endellite being visible.

In the Jurassic-Tertiary fold system (J - T) at a depth of 660.68 meters (the full depth not yet plumbed), on the top is brown, and brownish gray mudstone, with sulphuric and calcareous shale sandwiched with powdered sandstone, coal and coal measure. In the middle is purplish brown mudstone and grayish white fine sandstone of varying thickness interbedded with dark gray pelite. Below this are dark gray mudstone and silty mudstone sandwiched with brown pelite, and a thin deposit of limestone beneath which is a conglomerate of mixed colors. These layers may be compared with the Jurassic-Tertiary fold system of the Kuche depression. It abounds in palynologized rock.

as the strata below 4086.5 meters in this well are comparable to the Jurassic system in the A'an-1 Well and the Tienan-2 Well of the Kongque River area. It may be seen that the distribution of the Jurassic-Tertiary fold system of the East Tarim Depression is fairly extensive. It is linked to the tertiary fold system of the Kuche Depression, and to the possible tertiary fold system of the Southwest Depression area. It is conjectured that distribution of the tertiary fold system of the Tarim Basin is very possibly regional in nature.

The dark pelite in the well's Jurassic-Tertiary fold system has an accumulated thickness of more than 500 meters (it has not been completely drilled through), a terrain of moderate density, and a fairly good transformation coefficient. It is estimated that it becomes thicker and better toward the center of the depression, and that it will be one of the major strata for prospecting in the East Tarim Depression, on consequence of which estimated prospects for petroleum and gas in that region have been raised.

A later seismic cross-section across the Tarim River to the north of Yuecan-1 Well shows several seismic wave groups as being continuous and fairly good, with no discovery of evidence of a fault. It had been supposed that Shayilangi lacked a Mesozoic group, but this is no longer the view. Thus there is a new view of the deposit characteristics and petroleum and gas prospects for Shayilangi.

The tertiary angle of tilt below the well is very small, generally 2 to 3 degrees, while the angle of tilt of the Jurassic-Tertiary fold system is 15 to 25 degrees. In addition, beneath the Tertiary system can be seen a large amount of conglomerate and weathering that shows that between the two a long period of deposit interruption has been going on (a Cretaceous system is still lacking) and the angle formed is not conforming and contacting.

One can conclude that completion of work at Yuecan-1 Well will provide important data for evaluating petroleum and gas prospects in the Eastern Tarim Depression. Geophysical findings already obtained demonstrate that prospects for finding petroleum in Eastern Tarim are very great.

CONFERENCE HELD ON MEASUREMENT OF PETROLEUM RESERVES

Jiangling SHIYOU YU TIANRANQI DIZHI [OIL AND GAS GEOLOGY] in Chinese Vol 3, No 1, Mar 82 p 15

[Article by Fei Fuan [6316 1381 1344]: "Conference on Long-range Forecasting of Oil and Gas Reserves"]

[Text] Energy is the life blood of national industrial modernization, and oil and gas resources are particularly important. The size of oil and gas reserves bears on national energy policies and on the speed of development of industrial modernization. At this important historical time when China is in the midst of a new round of petroleum surveys, the Ministry of Geology assembled more than 60 specialists from subordinate petroleum survey and prospecting commands, petroleum survey and prospecting brigades, integrated petrogeology brigades, main petrogeology research laboratories, and academic institutions. Between 17 and 25 November 1981, they convened a study and work conference on forecasting long-range gas and oil reserves at Wuxi in Jiangsu Province at which they specifically explored the issue of China's oil and gas reserves, which was very timely and very much necessary.

At the conference, the first and second petroleum survey and prospecting commands, the Jiangsu Petroleum Survey and Prospecting Command, the Integrated Petrogeology Brigade, and the Main Petrogeology Laboratory gave briefings on the Subei Depression, the Dongtai Depression, and on the Southern Song and Tan Rivers, and northwestern Sichuan. They used mathematical simulation methods, and the Monte Carlo Method to calculate quantities of raw oil and raw gas, and they also engaged in enthusiastic discussion of calculation methods, the selection of parameters in calculations, and such technical and academic questions.

At the conference a briefing was also given on determination of dynamics parameters in oxidizing reactions of asphaltic (0049 0857 2954) on the heat evaporization method of determining light hydrocarbons in rock, on the relationship between subsurface pressure and initial petroleum movement, on maximum ancient earth temperatures borne by restored raw oil rock, and such research results. These heartening advances lay a solid foundation for China's building of a set of appropriate research methods and for setting forth pertinent parameters. The conference also emphasized problems in theory methods for calculating and

[illegible] oil and gas reserves. In light of actualities in China, they fully [illegible] the movement coefficients, hydrocarbon discharge coefficients, accumulation coefficients, and risk coefficients. They put forward goals to be tackled and methods to be employed in tackling them to provide greater and more reliable [illegible] data for figuring oil and gas reserves.

In summary, this conference unified perceptions, unified work methods and calculation methods, and increased confidence. This played a role in advancing [illegible] oil and gas reserve forecasting work.

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GUANGZHOU FORUM ON SEA OIL LOGISTICS BASES OPENS

HK280318 Hong Kong TA KUNG PAO in Chinese 28 May 82 p 2

[Dispatch from correspondent Li Wei-ching: "Guangzhou Seminar Opens; Chen Lizhong Speaks"]

[Text] Guangzhou, 27 May--On the first day of the seminar held in Guangzhou on building logistics bases for South China Sea oil it was revealed by Chen Lizhong, general manager of the South China Sea Oil Joint Services General Corporation of China, one of the sponsoring organizations of this seminar, that the Chinese authorities concerned are now drawing up a plan for overall development of the logistics bases for South China Sea oil. The bases include Shekou-Chiwan in Shenzhen, Hainan Island, Sanya and Zhanjiang. Guangzhou has been designated as the command headquarters. The possibility of turning Shantou into one of the logistic bases will be considered at a later stage. The objective of the above-mentioned plan is to form a "supply network of logistics bases for South China Sea oil" in order to cope with the pressing demands of offshore oil exploration.

Chen Lizhong revealed that in order to accelerate this work, the Chinese Offshore Oil Company, the Ministry of Petroleum Industry and the South China Sea Oil Joint Services General Corporation of China will form an "investigation team" to carry out inspection and exploration in groups in Chiwan, Zhanjiang and other areas. They are expected to complete the official development plan before the end of July.

In accordance with the tentative plan to build a "supply network of logistics bases for South China Sea oil," Guangzhou City will be the command headquarters and joint services center of the whole South China oil exploration project. The Chiwan base is some 70 nautical miles south of Guangzhou, Zhanjiang is some 240 nautical miles from Guangzhou; Sanya is some 480 nautical miles from Guangzhou, and Shantou City is some 240 nautical miles east of Guangzhou. Thus, in view of the geographical situation, such a supply network for the exploration of the South China offshore oil fields is rational and accords with practical needs.

According to the information obtained by this correspondent, Guangzhou City had previously drawn up a town plan. There was a plan to turn Huangpu, one of the satellite towns, into a medium-size city with a population of 300,000 - 400,000.

[illegible] building logistics bases for the South China Sea oil field, with [illegible] China, opened this morning. At the opening ceremony, Lai Zhuyan, [illegible] of Guangzhou made an opening speech first; Chen Lizhong, general [illegible] the South China Sea Oil Joint Services General Corporation of China, [illegible] talk on exploring the South China Sea oil fields and building [illegible] bases for offshore oil exploration. MacCarte [7456 0868 7378], honorary chairman of the Energy Commission of the American Chamber of Commerce in Hong Kong, introduced speakers from Hong Kong and abroad to the participants.

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SOUTH CHINA SEA OIL LOGISTICS MEETING CLOSES

HK290... [Hong Kong TA KUNG PAO in Chinese 29 May 82 p 1

[Report from correspondent Li Wei-ching: "Guangzhou Seminar Concludes Yesterday"]

[Excerpt] Guangzhou, 28 May--The Guangzhou "seminar on the building of logistics bases for South China Sea oil" concluded today after 2 days in session. Chen Liming, general manager of the South China Sea Oil Joint Services General Corporation of China, one of the seminar's sponsoring bodies, again stressed at the meeting today that Hong Kong would certainly play an important role in the course of building logistics bases for South China Sea oil.

Chen Liming spoke on four aspects of the close relationship between China's offshore oil exploitation and Hong Kong. First, at present many foreign oil companies have established offices in Hong Kong, and these offices are able to provide advanced technology and experience for the Chinese departments concerned.

Secondly, the South China Sea Oil Joint Services General Corporation of China has adopted the Mainland principle of organizing joint undertakings and cooperating with foreign countries. The corporation welcomes investors from foreign countries and from Hong Kong and Macao to invest in China.

Thirdly, to coordinate with the work of exploiting the South China Sea oilfield, the Chinese departments concerned recently set up their first specialized oil company in Hong Kong, the China Offshore Oil Services (Hong Kong) Company Limited, to have relevant contacts with Hong Kong and foreign investors. This company will be responsible for purchasing oil equipment from foreign companies, contracting offshore oil engineering jobs for foreign oil companies, and providing transport, lease and other services.

Fourthly, Hong Kong's economy and prosperity will be affected as soon as the development of the South China Sea oilfield speeds up. Hong Kong's location will be affected by the South China Sea oilfield, and it is bound to benefit greatly. In addition, the big increase in the numbers of personnel of foreign companies coming and going between Hong Kong and the interior of China will make Hong Kong's position become more important. Besides, food and fresh and salt water supplies from China will benefit some items of advanced technology and equipment and raw materials from abroad, and many of this will be shipped through Hong Kong.

[illegible]

Most of Wang Lidong's speech consisted of replies to questions raised by oil experts from Hong Kong. This correspondent learned from his contacts with the foreign businessmen that they very much hope that Hong Kong will do more for building the South China Sea oilfield and in support and maintenance work and so on.

A number of foreign oil experts told this correspondent, just as China is exploiting its oil resources on a large scale, prospects are bright for cooperation between the mainland and Hong Kong in this respect.

They also declared that at present there is a great need for oil-rigs throughout the world (including China). For instance, the number of orders being fulfilled in Asia by Japan, South Korea and Singapore is growing all the time. Hong Kong too has great potential and advantages in building oil-rigs and offshore oil engineering. One reason for this is Hong Kong's good grasp of efficiency and quality control; it can deliver the goods more quickly than other countries and regions.

According to this correspondent's information, apart from Hong Kong oil circles' interest in South China Sea oil, the Hong Kong authorities too are paying close attention to South China Sea oil tendering and exploitation. A number of senior Hong Kong Government officials say that although Hong Kong has not been chosen as a logistics base for South China Sea oil, it is certain that the exploitation of the South China Sea oilfield will be advantageous for Hong Kong, and Hong Kong is willing to cooperate in this respect.

At the seminar today representatives of six foreign companies delivered technical reports.

[HK: 2013/103]

BRIEFS

CRUDE OIL CAPACITY--Thirty-one oil wells have entered production at Huabei oilfield (SEMIMONTHLY NEWS has mistakenly reported 310 oil wells). The additive to the annual capacity is 900,000 tons. Huabei oilfield is one of our main centers of crude oil production. In 1976, the main reservoir (Zen-Chu reservoir) of this field went into production. Since that time, the geologists and oil explorers have continuously enlarged their field of exploration. So far, there are 18 reservoirs in production. Last year, they did much work and verified their programs. They have worked under 310 oil wells in the older reservoirs. There has been a general increase in the underground pressures of the reservoirs and the rich reservoirs may be spontaneously pumped in abundant quantities. At the end of last year, the Huabei Oilfield reached the goals for crude oil production, number of feet of oil well drilled, total industrial production and profit for our national government. The geological structure of Huabei Oilfield is complicated and the oil level is deep. In the past several years, the scientists, engineers and workers have carried out a considerable amount of scientific research and technological improvement in oilfield geology, oil production, automatic controls, etc., in order to improve the yield from the oilfields. They have obtained many new results. Text (Shijiazhuang HEBEI RIBAO in Chinese 14 Feb 81 p 1) 9699

CSO: 4010/40

INCREASE OIL PRODUCTION--Our province's oil refining enterprises conserved energy and increased revenue through technical improvements and doing depth processing work well even though the supply of crude oil reduced. In 1981, the amount of crude oil returned by the state was 1.4 million tons less than the previous year. With the additional tax on the sale of lubricating oil included, the reduction in profits from the two was originally estimated at 40 million yuan. But after exerting efforts, the profits did not lessen but an additional revenue of 10 million yuan was earned. In last year alone, 7 [illegible] completed 21 relatively important technical improvement projects [illegible] the main output products. Energy consumption visibly dropped and the combined comprehensive percentage rose 1.3 percent over the planned percentage. The refineries produced over 10,000 tons more of various products and created a profit of 20 million yuan for the state. Each oil refinery insisted on [illegible] production according to state plans, each was flexible in production [illegible] operation manner and many skilled people in the work of depth processing [illegible] and [illegible] the production of high quality export products and products meeting market needs. Limited raw materials were used in producing [illegible] products. Text (Shijiazhuang HEBEI RIBAO in Chinese 8 Feb 81 p 1) 9699

CSO: 4010/40

SUPPLEMENTAL SOURCES

'RESENT SITUATION AND PROSPECTS FOR DEVELOPING FIREWOOD ENERGY

Beijing NENG YUAN [JOURNAL OF ENERGY] in Chinese No 2, 25 Apr 82 pp 40-43

[Article by Huang Heyu [7806 7729 5038] of the China Forestry Science Research Institute: "The Present Situation and Prospects of Developing Our Nation's Firewood Energy"]

[Text] The reserves of charcoal, petroleum, natural gas, nuclear energy and such mineral resources are limited, their producing areas are concentrated, their use is limited by technological equipment, and they cause pollution. At the same time, as the world's nations of today increase their consumption of energy, these resources cannot satisfy the demands of social development. Firewood resources are low cost. They do not have a very high requirement for technology and equipment. Their producing areas are scattered and they can be regenerated. Their potential for development is very great. At a time when the shortage of energy is becoming more and more severe, firewood resources have again become the focus of attention by nations of the world. Our nation's territory is expansive and its population is large. The supply of fuel is not abundant. Developing firewood, especially developing fuel forests, undoubtedly is an important part of the many ways to solve the problem of energy in our nation's farm villages.

I. Present Situation of Firewood Resources in Our Nation

Generally speaking, firewood energy includes the following types: 1. Trees felled from fuel forests. 2. Firewood obtained from timber forests, protective forests, economic forests, sparse woods, shrub forests, trees on the "four sides", wood obtained by trimming, nurturing, thinning by felling and small area felling in rotation. 3. Remnants from felling trees after they have matured and remnants from forestation and processing. We know from the above that managing firewood is the main purpose. Fuel forests are an important part of firewood energy. Timber forests, protective forests and economic forests not only fulfills one major purpose, they also provide firewood. This shows that forests have many functions. Therefore, the amount of firewood energy is determined by the quantity and quality of the entire forest resource. The more forests there are, the more firewood energy there will be.

According to statistics compiled in the survey of the nation's forest resources from 1973-1976, the present forest area covers 1.83 billion mu. The reserve of forest wood is 9.5 billion cubic meters, and the annual yield of firewood is

148.2 billion jin. Over the years, the cumulative area preserved by forestation amounts to 420 million mu. The percentage of forest coverage has increased from 8 percent before liberation to 12.7 percent. The thermal value of the energy of our nation's forest resources is equivalent to the amount of heat generated by 3.9 billion tons of raw coal. This shows that our nation's forests have a great potential as a type of auxiliary energy. Our nation's forest resources include 54 million mu of fuel forests with a reserve of 44.71 million cubic meters and an annual yield of 43.2 billion jin of firewood, equivalent to 120 million tons of standard coal. This serves an important function in solving the energy problems in farm villages.

In recent years, because of the emphasis placed on fuel forests by the governmental departments at each level, many fuel forests have been planted. Many models have emerged, illustrating the important function of fuel forests in solving the energy problems in our nation's farm villages.

Yanling County in Henan province began forestation in 1963. In 1969, it realized greening of the "four sides". In 1975, the county basically realized a forest network in farmland. In recent years, only trees of the "four sides" and the protective forest network were trimmed and thinned. Each year, more than 300 million jin of firewood can be provided, equivalent to solving the problem of firewood for a farm village population of 250,000 people. Many localities have become self sufficient with surplus. This has reduced the amount of coal supplied by the state by more than 40,000 tons and it has also basically solved the problem of timber. According to measurements of four rows of Chinese white poplar of different ages by the Forestry Institute of the China Forestry Science Academy and the Yanling County Forestry Science Institute, 5,540 jin of branches and leaves that have been dried naturally can be trimmed per kilometer from the strip of the Chinese white poplar trees of six years old. This can provide enough firewood for 5 people to cook meals for a year. The ten-year old forest strip can provide 11,060 jin of firewood enough for 9 people to cook for one year. The sixteen-year old forest strip can provide 344,293 jin of firewood enough for 287 people to cook for one year. The 24-year old forest strip can provide 397,110 jin of firewood enough for 330 people to cook for one year (the above has been calculated at an average of 1,200 jin per person per year). This shows that the planting of protective forests serves an important function in solving the problem of firewood. Sule County in Xinjiang began to utilize sandy beaches, alkaline beaches and river beaches to plant fuel forests covering more than 85,000 mu beginning from 1973. Each family averages 1.6 mu throughout the county. This has preliminarily solved the difficulty of firewood and increased steel materials. Alkaline beaches were also improved. The Libu Commune in Changwu County in Guangxi now has 150,000 mu of fuel forests, constituting 25.9 percent of the area of forest land. They felled and utilized the fuel forests in rotation according to plans. They not only satisfied the need for firewood by the masses of the commune, over 50 million jin of firewood were sold to the state each year. At the same time, a lot of raw material was provided for the light industry.

It can be seen from the above that planting trees and forestation in a big way and protecting the currently available forest resources have a great potential to solve the energy problem in our nation's farm villages.

II. Superiority of Firewood Resources

Forests, especially fuel forests, have many unique qualities:

(1) Regeneration. Fuel forests are green plants that convert solar energy into bioenergy by photosynthesis and store it. Some people call this type of energy green energy. According to calculations by American scientists, plants store about 2 x 10 tons of coal with an energy of 3 x 10 joules each year throughout the world, about ten times the total annual consumption of energy in the world. Fuel forests generally have the ability to grow naturally. After they are planted, they will provide many years of benefits.

(2) Broad uses. Fuel forests can serve as a source of energy and they also have many functions. For example, they can preserve water sources, retain soil, regulate climate, improve the ecological environment, and create more favorable conditions for agricultural and livestock production. They can reduce silting of mud and sand and prolong the life of reservoirs. Fuel forests can solve a part of the problem in finding wood. fertilizers and hard wood materials. In addition, the problem of firewood in farm villages can be solved and people will not fell forests and destroy vegetation at will. Young forests can be preserved. Fuel forests serve the function that cannot be estimated in protecting forests and developing forestry.

(3) Strong adaptability. Charcoal, petroleum and natural gas and such energy sources are not distributed evenly and their supplies to farm villages will necessarily be limited by resources, transportation and available funds. Fuel forests can be planted at many places. They can be scattered and they can be planted in large numbers. They can grow on barren mountains, barren land, barren deserts, barren beaches and "the four sides". As long as they are planned well, as long as we actively plant trees and grasses, as long as we manage cultivation well, then, at least in 3 to 4 years or at most in a decade or so, we can fell firewood in rotation and the yield will increase year after year. The loess plateau and the Northwest windy and sandy regions have less people and more land. There is a broad region for developing fuel forests. Even in the plains or regions of river networks where there are many people and less land, as long as we fully utilize the "four sides" and spare land, stick the needle in every seam, the potential is very great.

(4) Non-polluting. Firewood also serves to improve the environment. Photosynthesis of plants serves importantly to regulate the atmosphere.

(5) Economic characteristic. Developing fuel forests is economically worthwhile. According to calculations, the cost of one mu of fuel forest is 30 yuan, 70 percent for labor and 30 percent for planting saplings. Eucalyptus is planted in the southern part of our nation. Gains can be realized within the year of planting. Generally, the trees are 3 to 4 meters tall. If the trees are felled in the second year, the trees would have already reached 6 to 7 meters. The per mu yield of firewood is 5,000 to 6,000 jin, and small diameter logs and wood for farm tools can also be harvested, and the cost could be recovered. The fuel forests of locust trees in the north can be felled as a crop four years after planting. The per mu yield of dry firewood is over

7,000 jin. Costs can be recovered in the fifth year. The cost of fuel forests that grow slowly can generally be recovered in 10 years or a dozen or so years, and the period of benefit can last several decades.

III. Prospect for Development

Although our nation's firewood energy, especially fuel forests, are limited at present, the potential is unlimited and the future is bright.

1. The development of firewood is based on soil resources. The availability of land to plant forests and fuel forests in a big way is the key to development. Our nation's territory is expansive and the area of mountain regions is large. China has always been known to have "seven percent of mountains, two percent of water and one percent of fields". There are many barren mountains and barren land suitable for forestation (See table).

Area of Barren Mountains and Barren Land Suitable for Forestation in Our Nation

Unit: 10,000 mu

Item	Area of barren mountains and barren land suitable for forestation	Percentage of the whole nation %
Region		
National	116250	
Southwest	31200	26.8
Northwest	13290	11.4
South Central	22560	19.4
Eastern	13080	11.3
Northern	15645	13.5
Northeast	20475	17.6

It can be seen from the accompanying table that the area of our nation's barren mountains and barren land suitable for forestation amounts to 1.16 billion mu and the land is distributed relatively evenly. There is rich and sufficient land for developing forests and planting fuel forests. Also, from the point of view of establishing ecological balance, we should plant various types of forests as quickly as possible. It is entirely necessary to use at least 25 percent or nearly 300 million mu of the land suitable for forestation to develop fuel forests. If the area can be planted within ten years, then calculating at 800 jin per mu, we can obtain 240 billion jin of firewood. This amount can solve the problem of firewood for 200 million farmers. If we add the firewood

from other types of forests such as timber forests and protective forests, there will be at least 400 billion jin. With the addition of currently available firewood resources, the amount will be nearly 600 billion jin. This can solve the problem of firewood for 500 million farmers. If by 1990 there are 900 million farmers, then 55 percent of the energy in farm villages can be solved (no including the massive amounts of newly planted tree products of the "four sides"). In general, the potential is great. Firewood and other energy sources can be matched, and the advantages can be utilized to supplement the shortcomings to ease the shortage of energy in farm villages.

2. At present, energy in our nation's farm villages is deficient and irrationally utilized. Irrational use is mainly because of direct burning. This backward method of utilization has a thermal conversion efficiency of only 15 percent or even lower. If we promote firewood conserving stoves in a big way, we can conserve 2 times the amount of firewood consumed now. In addition, we can utilize animal manure and tree leaves to manufacture marsh gas. This can conserve three quarters to four fifths of firewood, and we can also obtain superior quality fertilizers and fuel. In the broad forest regions, the results will be tremendous if we conserve the use of timber, do not burn good timber, and improve the rate of utilization of the three types of remnants from felling, cutting and processing. In the future, we can use timber to produce gasified or liquified fuel.

3. Forests are a resource that can be cultivated and renewed. As long as we fully develop the superiority of our nation's abundance of labor, then through various types of human endeavors, such as planting superior varieties and healthy saplings, implementing scientific forestation, careful cultivation, strengthening management and protection, promoting rapid growth and bumper yields, then the yield of unit area can be greatly increased. At present, our nation's unit area yield of forest is only 70 cubic meters per hectare, lower than the world average of 110 cubic meters. Some advanced forestry nations in Europe have taken forests that produce below 300 cubic meters per hectare as subjects for improvement. The yield of our nation's fuel forests (calculated at 800 jin) is also not high. The total yield per mu of plane trees of 3 to 4 years test planted in the United States can reach 40,000 jin. We need to study the techniques to increase the yield of fuel forests.

IV. Several Problems That Need To Be Solved at Present

1. Strengthen the building of forests and their management and protection. A sharp conflict between the demand for firewood in our nation's farm villages and forest resources and ecological balance exists. To solve this conflict, we must rapidly enlarge the area of fuel forests. We suggest that fuel forests be included in plans to develop forestry. Based on the actual situation in our nation, fuel forests should constitute about 10 percent of the area of forest land. For example, if there are 3 billion mu of forests, fuel forests should occupy no less than 300 million mu. After forestation, the forests must be conscientiously managed and protected to guarantee that the saplings become forests and produce timber.

2. The problem of private firewood mountains should be solved well. The best way and the main form to solve the problem of firewood is to help farmers set

up private firewood mountains. We should conscientiously implement the policy of establishing private mountains and concretely implement every plan. The area should be determined by actual situations. The trees and sideline forestry products planted on private mountains should all belong to commune members. This is a major policy to develop fuel forests. The results of planting trees in one year and receiving gains for many years can be realized only when this policy remains stable for a long period.

3. The policy of economic assistance should be implemented. The state should appropriate a fixed amount of funds to help the collective and commune individuals to build fuel forests. Forest wood could not be seen in the suburbs of Kunming City after forestation efforts in past years. Last year, that city appropriated 100,000 yuan and contracted barren mountains to the production teams. A subsidy of 25 yuan was given per mu. Contracts were signed to contract the work of planting trees, keeping the trees alive, managing and protecting the trees. A total of 4,000 mu was forested. The percentage of live trees was very high and management was also carried out in time. The saplings grew well. Considering the situation throughout the nation, all regions lacking firewood generally have a weak commune and brigade economy. It is necessary that the state give appropriate subsidies. Installment loans can also be given. Localities with better economic conditions should encourage the spirit of self reliance to plant fuel forests well.

4. Uncontrolled felling should be prohibited. Because of the shortage of energy in farm villages, uncontrolled felling of forests is rather serious. Some even cut down large trees and young forests and burn the wood as firewood. This way of looking at the immediate future without regard to the long term future will only create a vicious cycle. For this, the problem should be solved according to related policies and regulations of the state. At present, the waste of timber is very shocking. Take the three major forest regions in the Northeast as an example, the forestry workers of enterprises directly under the jurisdiction of the forest regions burn a total of 5,720,000 cubic meters of wood. Of this amount, only 50 percent are remnants from felling, cutting and processing. Nearly 3 million cubic meters of good timber are burned. Therefore, concerned departments must conscientiously study and advocate burning of remnants in forest regions and propose a solution.

5. The problem of technical guidance. In planting fuel forests, special attention must be paid to the selection of the varieties of trees so that measures can be suited to local circumstances and appropriate trees can be planted in appropriate localities. Arbor, shrub and grass should be combined, and timber forest, protective forest, economic forest, fuel forest should be combined. We must plant brushwood and fell it in rotation and prevent overfelling. Trimming of timber forests and protective forests must be appropriate. We must not trim too much and affect the growth of the trees.

9296
CSO: 4013/98

SUPPLEMENTAL SOURCES

METHODS FOR EARLY REACTIVATION OF METHANE PITS DESCRIBED

Shenyang LIAONING RIBAO in Chinese 15 Feb 82 p 2

[Article by Li Changshan [2621 7022 1472] and Gao Shijiang [7559 0013 3068]: "Methods for Early Reactivation of Methane Pits"]

[Text] With winter behind us and spring on the way, the weather is gradually warming up. Consolidating the experience of various places, we have found the following methods to raise the methane pit temperature, stimulate the activity of the methane bacteria and make the methane pits produce gas at an earlier date.

1. Remove the winter covering of the methane pit at the proper time. The time for removal is determined by the local temperature and the date of soil defrost. In terms of atmospheric temperature, places in Liaoning province reach a stabilized average temperature of 10°C at the following dates: 23 April in Dalian and Yingkou prefectures, 20 April in Chaoyang and Fuxin prefectures, and 20 April to 2 May in Tieling and Fushun prefectures. The soil thaw-out date in Dalian and Yingkou is usually 21 April, in Chaoyang and Fuxin it is usually 11 April and in Tieling and Fushun it is usually 1 May. Since the dates for soil thaw-out and 10°C temperature are relatively close together, the southern, eastern and western regions of Liaoning should begin removing pit coverings in late March to early April and the northern section of Liaoning should do so in April. In addition to atmospheric temperature and soil thaw-out, fermentation time of material in the pit should also be considered.

2. Remove the coverings by layers. In removing the pit coverings, they should not be removed all at once so as to avoid temperature drop and temperature difference affecting the methane action. After all the coverings are removed, the intake and output ports may still be covered with thin plastic sheets in order to make full use of the solar energy and increase the pit temperature. A thin covering of straw should be applied at night to reduce heat loss.

3. Partially adding new material or totally change old material. When all the coverings are removed, let out some of the old material and toss the gathered new material into the pit. This will increase the concentration of the liquid and also increase the pit temperature. For pits that have not been through a total material change for a long time, 70 to 90 percent of the material should be replaced. New material should be put together at an earlier date and when its temperature reaches 50°C it is then dumped into the methane pit using a high

concentration full load method. This method makes good use of the biological heat to raise the pit temperature and has the advantage of gathering abundant bacteria.

4. Problem pits should be repaired as early as possible. To improve the utilization rate of existing pits, problem pits should first be diagnosed with a pressure test to detect leaky and collapsed pits, and plugged-up and damaged gas pipes. Once damages are found they should be repaired or modified in time. For pits with a gas leak at the arch, take off the removable plug and paint with concrete grouting two or three times for a good seal before load it with materials.

9698
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SUPPLEMENTAL SOURCES

DEVELOPING METHANE IN RURAL VILLAGES

Guangzhou GUANGZHOU RIBAO in Chinese 20 May 82 p 1

[Article by Pan Qingneng [3382 1987 5174]: "Responsible Comrades of the Provincial and Municipal Committees Go to First Kengkou Brigade to Inspect the Work, They Asked Suburban Farm Village Commune Brigades To Develop Marsh Gas"]

[Text] Yesterday afternoon, the responsible comrades of the Chinese Communist Committee of Guangdong province and the city committee of Guangzhou City, Ren Zhongyi [0117 0112 1138], Liang Lingguang [2733 7227 0342], Xu Shijie [6079 1102 2638], Ou Chu [2962 0443] went to the First Kengkou Brigade of the Hedong Commune in the suburb to inspect the production of marsh gas. They fully affirmed the benefits of developing marsh gas in farm villages and its important significance. They asked the suburban farm village communes and brigades to concretely develop marsh gas of a mass character.

The responsible comrades of the province and city visited the family of commune member Liang Zhang [2733 4545] et al of the First Kengkou Brigade and saw the marsh gas pit built by these commune members and the facility to store methane gas. They asked them about their experience and benefits in developing marsh gas and heard the general report by comrades assigned by the related departments of the suburb and the commune to the brigade to help commune members develop marsh gas. The First Brigade of Kengkou constructed the three-in-one gas container type marsh gas pit, therefore the structure of the pit was relatively simple, the technique of constructing the pit was relatively easy to grasp, and construction was relatively convenient. The surface of the pit was flat and sealed, and the space on top of the pit could be fenced for raising hogs. A lavatory was built next to the pig pen, thus combining the pig pen, the lavatory and the marsh gas pit. Local commune members felt that there are many benefits in developing marsh gas. Marsh gas conserves fuel and favors the development of hog raising and other family sidelines, improves fertility, and improves sanitary conditions. Liang Zhang has a five-member family. He uses marsh gas as fuel and each year, he can conserve more than 2,000 jin of fuel coal. The savings, converted to fuel costs, could recover the investment in building the pit in just over a year. At present, this brigade already has 36 commune member families that have built 40 marsh gas pits.

The responsible comrades of the province and the city committees fully affirmed the achievements of the First Kengkou Brigade in developing marsh gas. They believed that the development of marsh gas in suburban farm village commune brigades has promoted production, improved sanitation, and it is beneficial to the building of socialist material civilization and spiritual civilization. Leadership must be strengthened to create favorable conditions and to carry out technical guidance to do the work of producing and supplying accessories needed in developing marsh gas well and to encourage commune brigades to develop marsh gas. The propaganda departments must propagandize the benefits and the significance of developing marsh gas in farm villages. The responsible comrades of the provincial and city committees asked the suburban farm village commune brigades to work concretely in developing marsh gas. Commune members who have done well in developing marsh gas should be praised and awarded.

9296
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CONSERVATION

PLANS, INCENTIVES TO REDUCE BURNING OF OIL DISCUSSED

Beijing NENG YUAN [JOURNAL OF ENERGY] in Chinese No 2, 25 Apr 82 pp 1-4

[Article by Yang Bo [2799 3134]: "Strive To Reduce the Burning of Oil and Strive Diligently To Conserve Use of Oil"]

[Text] The energy problem is a major one about which all countries of the world are currently concerned, and it is also a crucial problem in China's economic construction. In his "Government Work Report" given before the Fourth Session of the Fifth National People's Congress, Premier Zhao Ziyang pointed out, "Whether or not China's national economy will henceforth be able to maintain a fairly rapid speed of increased growth, and whether or not a new situation in development can come about will be determined to a large extent by whether or not energy and transportation problems can be satisfactorily solved."

The CCP Central Committee and the State Council have set forth clear programs to solve China's energy problems namely: a program of equal emphasis on development and conservation, with priority position being given conservation over the short term. Implementation of this program now requires cutbacks in the burning of oil, substitution of coal for oil, and increasing economic benefits from the use of petroleum as extremely important components of conservation work. Proper handling of this work possesses extremely important significance for the development of China's national economy, for increasing public financial revenues, for accumulating construction capital, and for advancing four modernization construction.

I

Both the CCP Central Committee and the State Council attach extremely great importance to reduction in the burning of oil and conservation in the use of oil. The State Council's "Directive on Reductions in the Burning of Oil for All Kinds of Boilers and Industrial Furnaces" issued in 1980 clearly set forth the scope and pace of reductions in the burning of oil. In 1981, the CCP Central Committee issued another directive on conservation of petroleum, which pointed out that the emphasis of energy conservation at the present time must be placed on the conservation of oil and, "every effort made to substitute coal for oil, resolutely reducing domestic petroleum consumption." "This is a major matter in helping steady development of the national economy." We must certainly deeply understand the importance and urgency of reducing the burning of oil and conserving use of oil, and diligently come to grips with this major matter.

Everyone knows that petroleum is a top quality energy resource possessing very high economic value, and is a precious one with a large variety of uses. The amount of heat produced by 1 kilogram of petroleum is 10,000 kilocalories, while the amount of heat produced by 1 kilogram of mixed coal is only 5,000 kilocalories. The quantity of heat derived from petroleum is double that of coal. Because the heat value and the heat energy utilization rate of petroleum is fairly high, and because it has many functions for which coal cannot substitute, the product value provided by petroleum of the same heat value will be much higher than that of coal. Looked at in terms of international price, the current selling price for China's oil is between $220 and $250 or more per ton of crude, while the selling price for a ton of coal averages $50. This means that as export goods, the foreign exchange created by petroleum trade is more than double that of coal of equal heat value. Analysis of the economic value of petroleum's diverse uses on the bases of pertinent data shows that when calculated in terms of current domestic prices, petroleum used on produce gasoline, kerosene, diesel oil, lubricating oil and other products provided the country with profits and taxes amounting to more than 100 yuan per ton. When petroleum is used as a raw material for the chemical industry, 1 ton of heavy oil can substitute for 3.4 tons of coal to produce synthetic ammonia or methanol, and can provide the state between 150 and 250 yuan more in profits and taxes. However, if petroleum is used as fuel for power generating boilers, a single ton of heavy oil can take the place of only 2 tons of coal, and can increase profits and revenues by only 2 to 3 yuan. Additionally, according to data from the United States, by processing crude oil into primary raw materials such as naphtha and light hydrocarbons, and by processing second grade products and basic raw materials for the chemical industry, which are then turned into various final products, they can change an output value of one into 10 and of 10 into 100. Even though we cannot do the same thing for the time being, changing one into three or three into nine would increase earnings by a sizeable amount. Consequently, how to equitably and effectively divide up the utilization of petroleum is an extremely important matter in promoting a benevolent cycle in the national economy, and in improving the country's financial situation.

Today China annually produces 100 million tons of petroleum, which is a very great wealth. However, it is not equitably used and great waste exists. It is very uneconomical to use petroleum as a fuel to be burned for boilers and furnaces, and economic benefits derived from such use are poor. In 1966, China burned more than 2.3 million tons of petroleum, and in 1981 petroleum burned as fuel for boilers and industrial furnaces amounted to almost 40 million tons (of which more than 6.8 million tons was crude oil). This was a 16 fold increase in 15 years and greatly exceeded increase in petroleum output for the same period. Between 1971 and 1980, China burned a total of 100 million tons of crude oil, an amount which when figured on the basis of current international prices amounts to 14 billion yuan more spent for fuel than would have been spent for the burning of coal. This is a very large figure indeed!

The reasons that have brought about this situation are various. In addition to mistakes we have made in our work, the main reason has been that during the period of the "10 years of chaos," as a result of the disturbance and destruction caused by the Lin Biao and Jiang Qing counterrevolutionary clique, many coal mines stopped or reduced their production. Coal could not be supplied, so

there was no choice but to substitute the burning of oil for some coal in order to meet pressing needs of the moment. After the smashing of the "gang of four," the State Council took numerous actions and devised means to reduce the quantity of oil that was burned. However, because development of coal production and increase in the amount hauled requires a process, and since conversion of oil burning equipment requires a certain amount of time and funds, and since oil burning electric power stations and furnaces that had formerly been planned and on which work had already begun started up one after another, overall reduction in the quantity of oil burned was not very great.

Internationally the era of cheap petroleum has passed. During the 1950's and 1960's, the western capitalist countries used cheap petroleum to actively change their fuel structure, and imported large quantities of petroleum as fuel for boilers, greatly increasing the proportion of petroleum used as a singular source of energy. Following the "petroleum crisis" of 1973, this became a heavy burden for them. Most recently, reduction in the burning of oil and conservation of oil has become a major integral part of the energy strategy of numerous countries. Since 1979, some of the major industrial countries have steadily held heads of state conferences to study and formulate programs and policies for reducing petroleum consumption. One such important measures has been decision to build no more electric power generating plans that use petroleum for fuel, and to gradually convert or shut down such power generating plants. Likewise, we positively cannot take this old road.

China's current 100 million ton annual output of crude oil can be maintained at that level and can likely be actually increased. Further prospecting for petroleum is underway on land and sea, and prospects for petroleum development are very good. It should be realized, however, that even should a fairly great increase take place in petroleum output in future, extreme care must be exercised in its use and economic benefits diligently sought. It should be used primarily as a fuel for internal combustion engines and jet engines, as a raw material for the petrochemical industry, as lubricating oil, and as oil for various special purposes. Some may also be exported, but it cannot be used as a fuel for burning. In future when national economic development will require fuel, the country's abundant coal resources can be relied on to solve the problem. This should be a major policy in China's energy distribution and use.

2

During the past several years, under the leadership of the CCP Central Committee and the State Council, all regions, all departments, and all enterprises have done a great deal of work to reduce the burning of oil and to conserve oil, and they have made definite accomplishments. During 1979 and 1980, many projects substituting coal for oil were brought to completion throughout the country for an accumulated 7.5 million ton reduction in the burning of oil. Approximately two-thirds of the capacity of industrial boilers that had originally been designed to burn coal, but which had been converted to burn oil, were reconverted to burn coal. Of the electric power generating units that had been converted to burn oil after having been originally designed to burn coal, almost 60 percent were reconverted for the burning of coal. Some equipment that burns natural gas has also started to be converted to burn coal. In the electric power

and metallurgy sectors, and in places such as Shanghai, Tianjin, and Liaoning where substantial quantities of oil are burned, fairly strict attention has been given this task. They have begun to investigate, study, and carry out technical and economic analyses of various kinds of oil burning equipment, and have proposed a scope, plans, and preliminary regulations for conversion. They have also had some initial success, insofar as financial and material resources have permitted, in the priority conversion of projects requiring relatively little spending of money, that produce results fairly rapidly, and that produce rather remarkable results in reducing oil consumption.

Some places and units have also actively experimented with and promoted experiences in the conservation of fuel oil. In heat processing furnaces for steel rolling, for example, by reducing the number of water pipes under the furnaces, or using plastic material to wrap water cooled pipes (or using waterless slide conveyers to take the place of water cooled pipes), and by insulating furnaces well and preheating the air, a more than 20 percent saving in oil has been effected. In glass smelting, use of furnace insulation, injecting hot air into furnaces, and sparging at the bottom of furnaces conserved about 30 percent of oil. By mixing water with fuel oil when it is used at a rate of about 10 to 15 percent water, a five to eight percent conservation of oil can be effected. After these experiences were extended to use in some enterprises in Shanghai, Beijing, and Tianjin, results were fairly good.

However, in an overall sense, the task of reducing the burning of oil and of conserving oil, throughout the country ha just begun, and numerous problems exist.

In the realm of reduced burning of oil, plans have not been sufficiently well fulfilled and actual reduction in amounts of oil burned has not been great. Between 1979 and 1981, plans called for an annual 8.4 million ton reduction in oil burning capacity through equipment conversions, but results have not met the pre-set target. During the 3 year period, reduction in oil burning through equipment conversions amounted to a cumulative 7.53 million tons. Because of a reduction of production quotas and readjustment of product structure in some enterprises, the natural reduction in quantity of oil burned amounted to a cumulative somewhat more than 2.7 million tons. Meanwhile, as a result of newly built oil burning equipment going into production, the burning of oil increased by somewhat more than 9 million tons, the increase and decrease largely cancelling each other out and oil burning being reduced by only slightly more than 1.1 million tons over a 3 year period.

In the realm of conservation in oil use, a very great gap exists between one area and one enterprise and another, and waste is rather serious. During the first half of 1981, oil consumption averaged 65 kilograms per ton of rolled steel nationally. In Shanghai and Tianjin, it had fallen to 50 kilograms, and in Beijing and Liaoning Province it was about 70 kilograms. In some steel rolling mills, however, it was as high as 300 kilograms, more than three times the national average. Within the same area, some glass plants consumed 17.68 kilograms of oil per case of plate glass while others consumed as much as 59.4 kilograms or 2.3 times as much. Last year heating furnaces nationally averaged a heat effectiveness rate of about 30 percent while it was more than 50 percent in foreign countries that had done a good job of energy conservation. Were

China able to increase it by 40 percent, oil conservation by rolling mills alone could be from 300,000 to 400,000 tons per year.

These problems show that the task we face in reducing the burning of oil is still very formidable and that potential for conservation of oil is still very great. At the same time they also reflect the low level of management in many enterprises and the existence of quite a few loopholes in work, which should arouse a high degree of serious attention on our part.

On the basis of national requirements, future targets for reduced burning of oil and conservation in the use of oil called for taking resolute and vigorous action between 1981 and 1990 to gradual substitute the burning of coal for the burning of oil, the burning of oil being annually reduced by 2 million tons from the previous year and being used for domestic processing or for export. Earnings thus realized are to be used in the construction of energy sources. This interchange is an extremely important strategic decision, and it is an important measure in striving for and increasing economic benefits, but it is also a very formidable task.

For individual units and individual enterprises, at current prices it is more economical to burn oil instead of coal. Investment is less; price is low; labor intensiveness is slight, operation is convenient, and advantages are considerable. However, in terms of the macro-economy, and in terms of overall benefits, the burning of oil in large quantities means that the country has to sustain huge economic losses. Therefore, we must establish a concept of the situation as a whole, figure overall costs, and consciously strive to complete this formicable task.

The key to reduced burning of oil in the country as a whole lies in the burning of oil for all kinds of boilers, and particularly the burning of oil for electric power station boilers, which take more than 40 percent of the oil burned. Before 1985, all industrial boilers, civilian boilers, and electric power station boilers that were originally designed to burn coal but were subsequently converted to burn oil are to be substantially converted to burn coal. If individual units temporarily cannot, for some special reasons, convert to the burning of coal, they are to report to the State Council for permission

Those electric power station boilers originally designed to burn oil (including power stations within enterprises) are to be converted to burn coal wherever conditions permit. Some medium and low voltage generating units may consider conversion to units that supply heat through the burning of coal or they may use the method of "construction first followed by stopping," in the planned, step-by-step use of newly built highly efficient coal burning generating units to take their place.

Industrial furnaces that burn oil should adopt different methods on the basis of their individual situations for piecemeal conversion over a period of time. Some furnaces, such as blast furnace injection, cement kilns (except for white cement), and some low temperature furnaces should try to convert to coal as quickly as possible.

Small oil refineries everywhere should conscientiously reorganize to improve product effectiveness rate and quality. Development of the single processing equipment in these plants should not be continued, and construction should be stopped at once where it is underway. Oil processing by small refineries will henceforth be strictly controlled and appropriately reduced. Some will have to halt production. In accordance with instructions from the State Council, small oil refinery boilers distributed in oil fields and other places are to be resolutely banned and closed for a period of time.

The burning of oil by petroleum enterprises, as with other units, has to be made part of state plan. Any that do not meet requirements for burning oil will have to convert to the burning of coal little by little over a period of time.

It should be pointed out that reduction of the burning of oil and conservation in the use of oil are tasks that have widespread ramifications requiring detailed organization to promote an overall balance for all parties concerned. Only when all departments and units attach a high degree of importance to them and work together can these tasks be completed solidly and completely.

In order to assure supplies of coal to take the place of oil, mine shaft construction will have to be hastened, halted construction of some mine shafts resumed, and some new mine shafts built to increase coal output. In addition the transportation of coal will have to be well organized, railroad line hauling potential tapped some stations and yards on some lines renovated and expanded, and construction of some ports and piers accelerated.

By summarizing the foreoing it is not difficult to realize that the job of reducing the burning of oil and conserving use of oil will not only be able to cut waste in the use of petroleum and increase the country's financial income, but can promote development of the coal, the communications and transportation, and machinery manufacturing industries, promote the technological improvement of the electric power, metallurgy, chemical, and other industries, and help the healthy development of the entire national economy.

4

The key to doing a good job of reducing the burning of oil and conservation in the use of oil lies in the strengthening of leadership and in taking conscientious and effective action to do this work meticulously and solidly.

In the course of this year's reorganization of enterprises, reduction of the burning of oil and conservation in the use of oil are to be an important part of improvements in administration and management. All enterprises with projects for conversion from oil to coal should fulfill their conversion tasks in accordance with plan requirements. All oil burning units should intensify management over oil supplies, set strict consumption quotas, and formulate actions to reduce oil consumption. At the same time, all units are to put into effect fuel oil supply quotas in accordance with State Council regulations, assign sole responsibility for use with no augmentation of supplies if quotas are exceeded, and use the savings effected to increase output, formulating specific commensurate regulations.

Oil to gas conversion plans must be diligently prepared so that plans for cutbacks in the burning of oil will dovetail with conversion, the pace of conversion, and with production, transportation, and distribution of coal, and so that provisions are made for funds, materials, equipment, and construction forces. Conversion projects to reduce the burning of oil generally have to be planned a year ahead of time so that all criteria for cutbacks in oil burning can be met. Enterprises using more than 10,000 tons of coal annually, and electric power plants in particular, should make efforts to get supplies from specific places.

Conversion funds provided by the state to reduce oil consumption are to be treated as special purpose funds that cannot be diverted to other purposes, and if they have been diverted, they must be recovered. The direction and emphasis of use of these funds must be arrived at on technical and economic grounds after which the projects for which they are to be used should be determined and made a part of the state plan. After these projects have gone into production, it will be necessary to organize forces to examine their economic results.

In order to arouse the enthusiasm of enterprises for reducing the burning of oil, commensurate encouragement policies should be formulated. All enterprises not included in state plans for oil reduction who carry out a substitution of coal for oil, and all electric power plants originally designed to burn oil that convert to coal thereby saving state investment of funds, as well as those that fulfill ahead of time planned projects for conversion to reduce oil consumption should be given a certain bonus for use in the enterprise's technical improvement, for energy saving measures, and for staff and worker welfare. Bonuses for conservation in the use of oil should be made in accordance with State Labor Administration, Materials Administration, and Ministry of Finance regulations.

In order to do a better job of reducing the burning of oil and conserving use of oil and to get greater and faster results, it is hoped that all industrial departments and all areas will institute, in accordance with pertinent documents and directives issued by the CCP Central Committee and the State Council as regards reduction in the burning of oil and conservation in the use of oil, a general survey, summarization, and exchange of experiences to promptly discover and solve problems and to intensify scientific research and experiments on oil conservation, to actively promote effective oil conservation techniques, and to give steady impetus to this work.

9432
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PLANNED USE, CONSERVATION OF ELECTRICITY IN BEIJING

Municipality's Power Situation 'Getting Tighter'

Beijing BEIJING RIBAO in Chinese 22 Feb 82 p 1

[Article by Guo Jiali (6753 3023 2698)]

[Text] The director of the Beijing Electric Power Bureau has pointed out that the power generating capacity of our city is getting tighter. We must establish an overall plan for the use of electricity and we must reduce our consumption of electricity.

What is the future of the supply of electric power for the Beijing area in 1982? The director of Beijing Electric Power Bureau has discussed this question with the reporter of this newspaper.

Under present conditions, the electric power supply for this year in the Beijing area is tighter than last year.

Since Liberation (establishment of Chinese Peoples Republic in 1949-50), the power-consuming industries of this city have grown tremendously. From 1949 to 1980, the generating capacity has increased by a factor of 69. However, during the same period, the growth in consumption has been even larger, a factor of 76. Thus an equilibrium cannot be reached between the supply and demand. Since the demise of the "gang of four", the central work of our party has shifted. In our city, industrial and agricultural productions have recovered and have developed further. The tourist industry is prospering. Municipal services have increased. The living conditions of the people have improved. Numbers of household appliances have increased. The electric power consumption has increased tremendously. The mismatch between supply and demand is getting worse. In the past, the Beijing area supplied electric power to the cities of Tianjin and Tonshan. In the last 2 years, Tonshan has been supplying electric power to Beijing. Even so, last year was the worst year since the liberation as far as the city's short supply of electric power. The shortage for November was particularly serious. The shortage in power supply, number of times that electricity has to be turned off, and other figures are worse than the Novembers of other years. From the expected developments in industrial and agricultural productions, transportation requirements and household consumptions, it is estimated that the power consumption of this year will be higher than last year by about 0.6 billion kilowatt-hours.

At present, the oil-fired power stations have reduced their outputs in order to conserve fuel oils, the hydroelectric power stations have stopped operations because of the lack of rain. Only coal-burning power stations are still supplying electric power. The supply of electric power for this year can be maintained at the level of last year only by operating the coal-burning stations at full capacity and by borrowing from neighboring provinces and cities. Usually, May is a month of peak consumption due to irrigations of farmlands, November is also a peak month due to increased industrial production and winter heating. The shortage this year is expected to be worse than last year. Daily peaks occur around 6-9 am and 6-9 pm. There are daily shortages of power supply during these periods.

The basic solution to this problem is the construction of extra generating capacity. At present, some stations are expanding and some stations are under improvement for the Beijing-Tianjin-Tonshan electrical network. The electric networks of neighboring provinces are also modified in order to supply power to Beijing. However, constructions in electric power industry take long periods of time. The improvements will be gradually effective after 1984.

An alternative solution is better planning of electric power usage and conservation of power. We must guarantee the availability of power to certain users who must depend on the electricity. The less crucial users should have a limit on their consumption and there should also be power cutoffs during peak consumption periods. Otherwise, there may be shortage for the whole city and then electric power cutoffs must be spread over even larger areas. It could even cause overload and shutoff of electricity completely. This may also threaten the safety of the entire electrical network. The scheduling of power usage at non-peak periods can improve considerably the present shortage of generating capacity. Everyday in Beijing, there is a low peak in power consumption after midnight because most factories are closed and most people are asleep at that time. There is an excess capacity of several hundred thousand kilowatts; this extra power cannot be stored. Many electric generators are turned off at night or are operated at reduced capacity. This is not as economical as continuous operations. If many factories and non-assembly line operations with high power consumptions such as metal fabrications, heat treatment and electrical furnaces, can operate during this low-peak period, then the shortage of 0.6 billion kilowatt-hours may be reduced by one half for this year. There is also much potential for conservation of power. There are serious waste of electric power. The equipments of many factories are outdated. The organizations of many production units are not ideal. Many units have also wasted electricity because of fixed costs. We sincerely hope that the citizens of our city, various organizations and industries can all work together toward better planning and better conservation in order to accelerate further development of our society.

Better Planning Would Ease Crisis

Beijing BEIJING RIBAO in Chinese 22 Feb 82 p 1

[Editorial]

[Text] Better planning for the use of electricity and conservation of usage can moderate the crisis of electric power shortage at the present time and can guarantee the success of the production and development of our city and the requirements of the living of the people.

At present, many units have already done so or are planning to do so in the near future and have achieved definte improvements. However, some units have also emphasized that "limitations of power consumptions would reduce our output and our profit" and that "working at the low peak of consumption after midnight is highly inconvenient". These excuses have been used to avoid the guidelines of electric power consumptions set by the authorities. Others feel that their unit is so important that electric power must be guaranteed and thus they have the right to waste electric power. This is especially true for the "fixed-cost" units, the individual uses electricity while the government pays. Some individual would use electric heater supplied by the government to save his own coal.

These occurrences indicate the inadequacies of the departments in charge of electrical power usage and the need for them to strengthen their management of power usage. At the same time, it also underscores the lack of understanding of electric power generation and the present crisis in electric power supply among many organizations and many comrades. The main characteristics of the electric power generation industry is the unified nature of generation, transmission and consumption. There is no power storage of the excesses. It is also necessary to maintain the balance between supply and demand in order to guarantee the steady supply of electricity. However, the rates of consumption vary continuously. For example, the power consumptions of streetcars and subways reach their peaks during the morning and even rush hours, electric lightings and televisions basically operate in the evenings. Therefore, the electric power consumptions are usually the highest during the daytime working hours and during the early evening hours right after it gets dark and before people go to sleep. There are periods of low power consumption (the valleys) at noon and after midnight. There are only a few hydroelectric generating stations in the Beijing-Tianjin-Tangshan electric power network. Furthermore, the hydroelectric power generation has stopped altogether because of the lack of rainfall. There is not much leeway for the electrical network to meet the varying demands of electric power usage, it is therefore necessary to regulate the hours of electric power supplies by scheduling the non-assembly line industrial usages into the valleys of power usages in order to maintain the balances between supply and demand, and to maintain the maximum efficiencies of the generating stations. If there is a power shortage during the peak periods of usages, then there will be drops in the quality of electric power supply, and this will effect the performances of the equipments of the users, the qualities of their products, and the quantities of their products. Also, this may cause damages to the generating equipment and electric equipments. If these damages did occur,

it will be detrimental to production, work and our living conditions; the limitations of power usages would be imposed on many more organizations. Therefore, the enterprises and the people of our city must understand the whole picture and must spontaneously maintain our planning of usage of electricity, conservation of electricity, and to reduce the peak load of electricity. We must correct those wrong-doers who ignored the regulations of the government and the authorities and have consumed more power than assigned at unregulated hours and at the peak-loading hours. We hope that various organizations can emphasize and can work toward the policies of planning and conservation so that there will be rapid improvement in the situation of electric power supply to our city.

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LIAONING CONSERVATION EFFORTS INTENSIFIED

OW120235 Beijing XINHUA in English 0213 GMT 12 Jun 82

[Text] Shenyang, 12 Jun (XINHUA)--Liaoning Province, China's biggest heavy industrial center, has redoubled efforts for energy conservation in the past two years, provincial officials said.

In the past two years, the province has put up 102 energy conservation projects, which help to save annually an average of 500,000 tons of coal and 80,000 tons of oil. Exhaust heat recycled in the past few years is equivalent to the amount generated by 1.5 million tons of standard coal, they said.

Energy consumption in Liaoning Province accounts for 10 percent of the national total, more than any other province, municipality and autonomous region, they said. Energy saving is being stressed as part of the overall task to readjust its industrial development for still better economic results.

The province has 14,000 large and medium-sized industrial enterprises, most of which are equipped with boilers made in the 1930's or 1940's with a high rate of coal consumption. Efforts are concentrated on renovating the existing equipment to improve energy efficiency.

The province has 32,000 industrial and other boilers, consuming 15 million tons of coal a year. Of these, 5,000 have been transformed in the past two years resulting in a saving of 130,000 tons of coal annually.

While transforming outmoded equipment, the province started construction on 33 power stations that will use exhaust heat from factories to generate electricity. The ten power generating units already put into operation at these stations generate 100 million kilowatt hours of electricity a year.

Heat supplying centers have been put into operation in major cities to replace 1,534 boilers. These supply heat to apartment, factory, office and other buildings with floor space totaling 9.77 million square meters and saved 340,000 tons of coal last winter and this spring.

CSO: 4010/9

CONSERVATION

NEW HEAT SUPPLY STEAM TURBINE GENERATOR SAVES ENERGY

Beijing GUANGMING RIBAO in Chinese 10 Feb 82 p 2

[Article by Wu Pingping [0702 1627 1627] and Jin Wenhao [6855 2429 3185]: "China's New Heat Supply Steam Turbine Generator Put Into Production"]

[Text] China's first heat supply steam turbine, which supplies both heat and electricity for overall utilization of thermal energy, designed especially for use at small chemical fertilizer plants was put into operation recently at Jiangning Chemical Fertilizer Plant in Jiangsu Province. It is now generating electricity in parallel with the network. The assembly is operating smoothly and generating approximately 2,300 kwh of electricity an hour. According to estimates, after this unit was put into operation, this plant could not only save more than 5,000 tons of raw coal and fuel coal, but also net 20 million kwh of electricity.

Practicing joint heat and electricity production is a measure of energy conservation technology based on a theory of thermal energy systems engineering. Through a combination between boiler and heat supply steam turbine generator assembly, steam is utilized not only to generate electricity but also to supply heat for processing. So the thermal energy is utilized twice and the average thermal energy utilization rate is raised from 55 percent in the past to 85 percent. Nanjing Chemical Engineering Power College and Jiangning Chemical Fertilizer Plant have worked in cooperation with the concerned scientific research department and formulated a rennovative energy conservation technology plan centered around joint heat and electricity production. The Nanjing Steam Turbine and Electric Machinery Plant and the Nanjing No 2 Chemical Engineering Machinery Plant have undertaken the tasks of design and construction of the heat supply steam turbine generator assembly and the secondary high pressure boiler. Jiangning Chemical Fertilizer Plant, where this assembly was installed, produces 20,000 tons of synthetic ammonia yearly, consuming in the past 2.1 tons of standard coal and 1,384 kwh of electricity for every ton of synthetic ammonia produced. This assembly is currently generating nearly 50,000 kwh of electricity each day, amounting to approximately 40 percent of the daily electricity need of the entire plant. When the construction work of the entire rennovation plan is completed, the coal consumption per ton of synthetic ammonia produced is expected to be reduced by 756 kg, the cost by 78 yuan or so, and the annual economic profit may reach as high as 1.64 million yuan. The total investment on the rennovation work of the entire facility can be recovered within 1 and 1/2 years.

Today, there are more than 1,500 small chemical fertilizer plants with less than 30,000 tons annual yield. If only one-half of these plants could be rennovated and utilize the joint heat and electricity production format, approximately 4 million tons of industrial coal could be saved while 30 billion kW-hr of extra electricity could be generated each year.

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